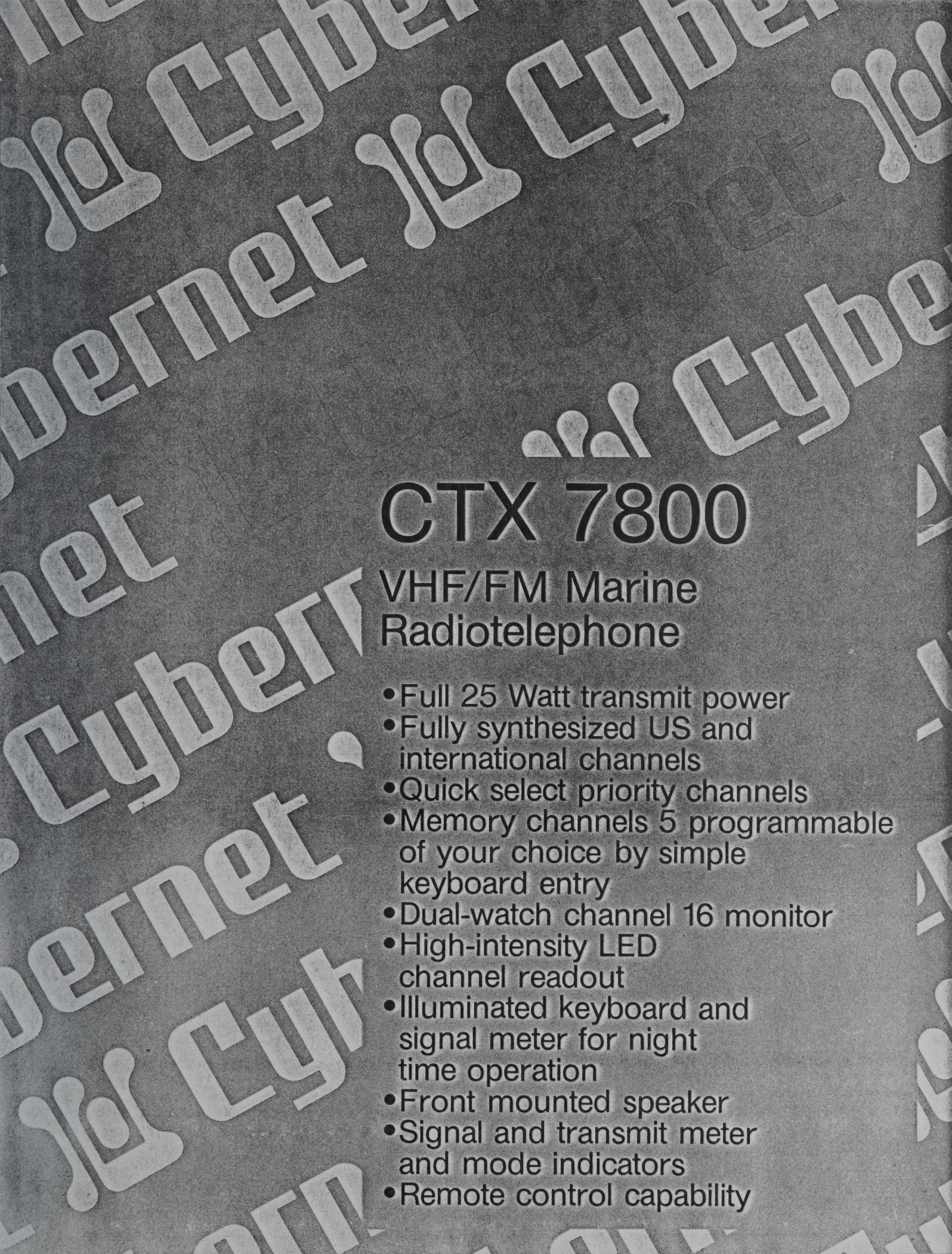

Cybernet
CTX 7800
VHF/FM Marine
Radiotelephone
•Full 25 Watt transmit power
•Fully synthesized US and international channels
•Quick select priority channels
•Memory channels 5 programmable of your choice by simple keyboard entry
•Dual-watch channel 16 monitor
•High-intensity LED channel readout
•Illuminated keyboard and signal meter for night time operation
•Front mounted speaker
•Signal and transmit meter and mode indicators
•Remote control capability

Important

In compliance with certain state laws, the manufacturer of the equipment you have purchased, is required to provide suitable space in your instruction manual to enable you to record the Model and Serial numbers of the equipment and to provide you with a description of the location of such numbers on the equipment. When you have entered the required information in the spaces provided below, you should retain the manual so that you have a permanent record of these Model and Serial numbers.

Unit description: VHF FM Marine Radiotelephone

Model No.: CTX-7800

Serial No.
[Located on rear or underside of unit]

Specifications

General:	
Frequency range:	
Transmitter:	156.00 – 157.50 MHz
Receiver:	156.00 – 163.00 MHz
Number of channels:	
Transmitter:	55
Receiver:	78
Supply voltage:	13.6 volts DC negative ground
Antenna impedance:	50 ohms
Modulation:	16F3
Microphone impedance:	600 – 2000 ohms
Current drain:	
Transmitter H/L:	6.0A/2.5A
Receiver stby/rated:	0.6A/1.5A
Temperature range:	–20°C to +50°C
FCC:	Part 81, 83 & 15 DOC
Dimensions:	9-13/16"W x 3-3/8"H x 12-7/8"D(250 x 84 x 327 mm)
Weight:	Approx. 8.6 lbs. (3.9 kg)
Transmitter:	
Output power:	25W/1W
Deviation:	±5 kHz max. @ 1 kHz
Spurious & harmonics:	–70 dB
Audio frequency response:	+1, –3 dB, 300 – 3000 Hz
Distortion:	5%
Receiver:	
Sensitivity:	
–12 dB sinad:	0.3 μV
20 dB quieting:	0.35 μV
Squelch sensitivity:	
Threshold:	10 dB noise quieting
Tight:	2 μV
Modulation acceptance bandwidth:	±7 kHz
Spurious & image rejection:	–70 dB
Intermodulation rejection:	–70 dB
Selectivity:	–70 dB
Hum & noise:	–50 dB
Audio frequency response:	+1, –8 dB, 300 – 3000 Hz
Audio output 10% THD 4 ohms:	5 watts

General Description

CTX 7800 VHF/FM Marine Radiotelephone:

The CTX-7800, conceived as the ultimate fully synthesized U.S. and International VHF/FM marine radiotelephone, resulted in a sophisticated unit that combines simplicity of operation with the most advanced capabilities in marine communication.

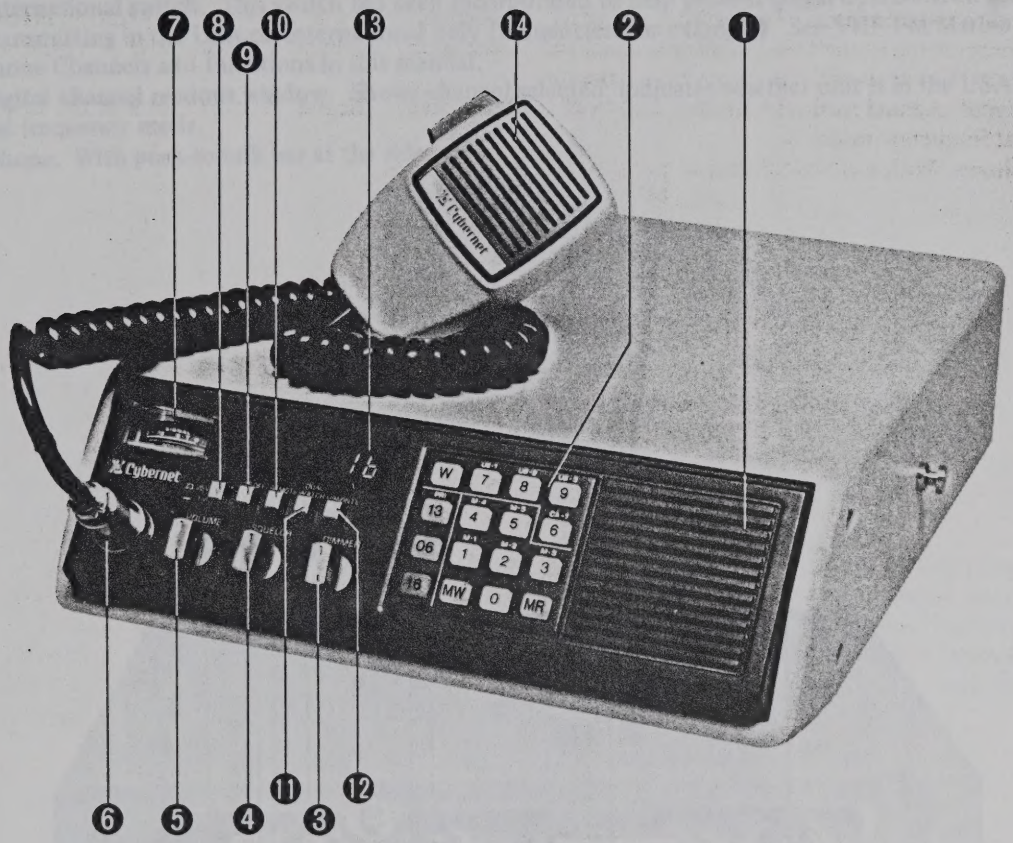
Incorporating the latest designs in micro-processing technology, the CTX-7800 provides continuous performance and reliability with minimal current consumption. Because of its corrosion resistant construction, the CTX-7800 is uniquely suited to the harshest marine environment. An optional full function remote is available where an additional station may be required. The CTX-7800 establishes a new criteria of excellence in VHF/FM radiotelephone.

The transmitter section of the radiotelephone has been designed to exceed the requirement of intermittent marine service, which is defined as a 50% duty cycle to 2 minutes transmitting followed by a period of 2 minutes receiving. Operating the radiotelephone within these limits will assure long trouble-free service.

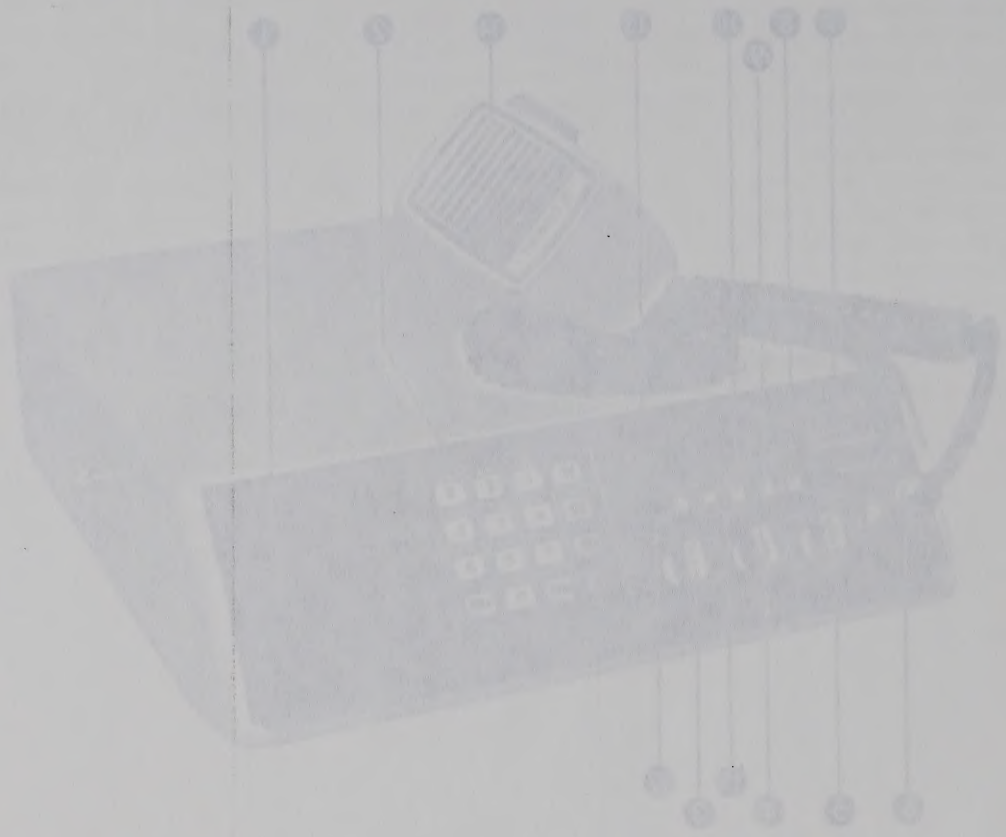
A convenient mounting bracket system provides easy mounting under virtually any conditions desired and permits quick removal.

Before operating the CTX-7800 you must obtain your license. Transmitting without the appropriate license is illegal. The license can be obtained by submitting completed FCC Forms 506 and 753 to the Federal Communications Comissions. Furthermore, you are required to read and understand Parts 81 and 83 of the FCC Rules and Regulations prior to operation of this radiotelephone. It is the user's responsibility to see that this radiotelephone is operating at all times in accordance with the FCC Rules and Regulations.

For servicing we recommend that you consult with the dealer from which you purchased the radiotelephone, since you are prohibited by the FCC to adjust the transmitter circuit of the unit unless you hold a current First or Second class radiotelephone license. A citizens band or amateur license is not sufficient.



❶ **Speaker.** Built-in, front mounted speaker. Water-proofed.
❷ **Keyboard.** The keyboard consists of digit keys 0 through 9, priority keys of 13, 06, 16, and function keys of W, MW, and MR. Certain keys also activate secondary functions described by a character on the particular key. LED readout 13) indicates which channel, which band, (or duplex mode) the unit is set on.
❸ **Dimmer control.** Lets you manually adjust brightness of LED readout.
❹ **Squelch control.** This quiets the receiver section when signals are not being received and thus allows quiet standby operation. Starting at the fully counterclockwise position (minimum squelch), rotate the control clockwise until the receiver is just quieted when no signal is being received. Incoming signals will automatically release the squelch and be heard. Careful adjustment is necessary, since setting this control too far clockwise will not allow weaker signals to overcome the squelch action.
❺ **Off/Volume control.** This control turns the power on and controls the sound output from the built-in or externally connected speaker. To switch the unit off, rotate the control fully counterclockwise until a click is heard.
❻ **Microphone jack.** Accepts the plug from microphone supplied with the unit. The mic jack has a locating key which permits the mic plug inserted in only one way. Align mic plug onto the key without using force.
❼ **Signal strength/RF power meter.** Used to indicate the relative strength of an incoming signal (when receiving) and the RF output power (when transmitting).
❽ **25W–1W switch.** This switch selects either 25W or 1W transmit power. With the switch set to 25W position, the radiotelephone will produce full rated transmit power for longer communication range. The 1W position will produce 1W for short range communications.
❾ **Speaker Off switch.** Deactivates the built-in speaker when using the remote control unit or optional telephone handset.
❿ **Remote switch.** This unit can be operated with an optional remote control unit. This switch is placed in the REMOTE position only when a remote control unit is used. For normal operation, the switch is left in the OFF position.
Note. Placing the switch in REMOTE position when a remote control unit is not connected will completely disable the radiotelephone.

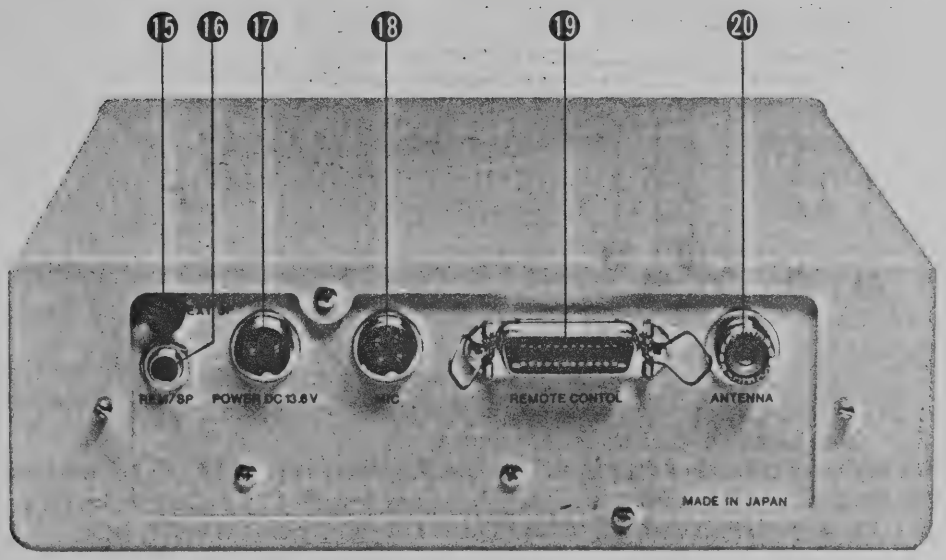


⓫ **Channel 16 auto monitoring (Dual Watch) button.** Setting this switch on (depressed) will let the receiver start continuous switching between the main channel (selected on the keyboard) and channel 16, until a signal is actually received on channel 16.

⓬ **USA-International switch.** This switch has been incorporated to help prevent illegal operation on certain channels (transmitting in the USA on international only frequencies, for example). See VHF FM Marine Radiotelephone Channels and Functions in this manual.

⓭ **LED digital channel readout window.** Shows channel selected, indicates whether unit is in the USA or international frequency mode.

⓮ **Microphone.** With push-to-talk bar at the side.



Rear Panel Connectors

⓯ **External speaker jack.** Used for connection of the audio plug from an external speaker (or horn). Insertion of the speaker plug (standard 1/8" 'phone' plug) into this jack will automatically silences the built-in speaker.

Note. A protective rubber seal cap is installed over this jack. Do not remove it unless you are using the jack.

⓰ **Remote speaker jack.** Used for connection of the audio plug from a telephone type handset available optionally for use with the CTX-7800, from the dealer.

⓱ **13.6V power connector.** DC power to operate the unit is fed through this connector using the DC power cables supplied. The connector has a locating key and allows the plug fitted in only one way. Align the key onto the connector without using force.

⓲ **External (Remote) microphone connector.** This connector is for use when the radiotelephone is mounted flush into a cabinet or overhead. The microphone may be remotely mounted next to the helm.

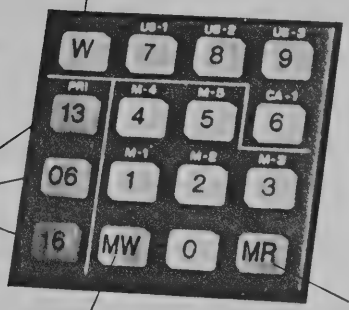
⓳ **Remote control connector.** Where an additional station may be required, an optional full function remote may be attached to this multi-pin connector.

⓴ **SO-239 antenna connector.** Accepts a PL-259 antenna connector. The cable from the antenna should be terminated with this type of 50 Ohm connector.

Operating Procedures

Keyboard Operation

Weather Preselection Key.
To monitor weather broadcasts, first depress this key, then select desired weather channel by US-1, US-2, US-3, or CA-1.



Priority Channel Keys.
Depressing these keys permits direct access to assigned channel.
Functions for these channels are:
Channel 13:
Navigational.
Channel 6:
Intership Safety.
Channel 16:
Distress, Safety, and Calling.

MW Key.
Used for memory entry. When depressed channel numbers on LED display starts twinkling and place you to assign memory locations (M-1 through M-5).

MR Key.
Used for memory recall. To recall stored channel, first depress this key, then depress one of memory keys (M-1 through M-5) desired.

To Receive Weather Monitoring Channels:
The United States Weather Bureau broadcasts official weather conditions from certain locations on various frequencies.
The CTX-7800 is capable of receiving these transmissions including the Canadian weather broadcast service (CA-1).
Consult you local weather bureau office for further information concerning these services.
To receive weather broadcasts:
(1) Depress W key. The channel readout should now start flickering (indicating the previous channel number). This is the sign to accept weather channel selection.
(2) Depress the desired weather monitoring channel key – US-1, US-2, US-3 or CA-1 on the number keys 7, 8, 9, and 6 **within 3 seconds** after the W key has been depressed.
Important. If you have failed to depress one of the weather monitoring keys within 3 seconds, simply depress the W key again, and proceed to step (2) again.

Weather broadcast frequencies:

Weather channels	Frequency	Broadcaster	Channel readout
US-1	162.550 MHz	NOAA	'U-1'
US-2	162.400 MHz	NOAA	'U-2'
US-3	162.475 MHz	NOAA	'U-3'
CA-1	161.650 MHz	Canadian weather service	'C-1'

To select normal channels:
For example:
To select channel 22:
(1) First set the USA/Int switch as desired.
(2) Depress 2 key twice. The channel readout will show '22'.
To select channel 65:
(1) Depress 6 key.
(2) Depress 5 key. The channel readout will show '65'.
Important. If you have depressed illegal channel numbers (i.e. '37', '99', etc.) the unit is set to channel 16 automatically thus preventing illegal channel operation.

To receive:

Before attempting to operate your radiotelephone, make sure that the antenna is connected to the unit rear antenna connector properly.

(1) Turn power on by rotating the Volume control.
(2) Rotate the Squelch control fully counterclockwise.
(3) Check that the Dual Watch button is in released condition.
(4) The unit is set to channel 16 automatically, after power switched on. This is the channel you are required to monitor and to make initial radio contact on. The radiotelephone is ready for instant reception or transmission on the selected channel since it does not required a warm-up period.
(5) Set the USA/INT switch as required. **Depressed**: USA; **released**: International.
(6) Adjust the Volume control for the desired listening level.
(7) Adjust the Squelch control to a point where the audible hissing noise is just cut off. If some station is transmitting on channel 16, adjust the Squelch control to a point where the speech is clear but the noise between transmissions is cut off.

Important. Do not attempt to transmit on channel 16, if another station is transmitting.

Channel 16 Automatic Monitoring (Dual Watch) Operation

The CTX-7800 incorporates the dual-watch channel 16 monitoring capability. With the Dual Watch pushbutton depressed the receiver section operates to scan between channel 16 and any channel selected on the keyboard.
(1) Set the Dual Watch button released initially.
(2) Adjust the Squelch control slowly, rotating clockwise until the background noise (no transmissions should be present on the channel) just disappears.
Important. Care should be taken to squelch adjustment in the dual watch operation since too far counterclockwise setting of the Squelch control will introduce the objectionable background noise received on channel 16 which interrupts the scanning between the two channels.
(3) Select the desired channel on the keyboard.
(4) Depress the Dual Watch pushbutton in. Now the letters 'DW' should appear on the channel readout area. In this condition the receiver will continue scanning between channel 16 and the main channel and if a signal is actually received on channel 16 the receiver will stop the scanning and continue receiving channel 16 as long as the signal stays on channel 16.
The letters 'DW' in the channel readout area will flicker while signals are received on channel 16.
(5) For normal operation, reset the Dual Watch pushbutton released.
Important. During dual-watch operation, keying the microphone transmit switch causes to transmit only on the main channel.

To transmit.
(1) Monitor channel 16 to be sure the channel is clear before operating your transmitter.
(2) Depress the microphone transmit switch and talk into the microphone holding it about 5" to your mouth. The red transmit lamp will go on when the microphone transmit switch is pressed.
Important. When the unit is in the 'Dual watch' mode pressing the microphone transmit switch will cause the unit to transmit on the main channel (selected on the keyboard) and **not** on channel 16. To transmit on channel 16 be sure to set the Dual Watch button released.
(3) To receive, release the transmit switch.
Note. During transmission the keyboard entry is impossible.

Important Operating Notes

Listen to a channel before transmitting on it. You may be interrupting important communication.
Always identify your boat by giving its call sign and name at the beginning and end of each message.
Keep a log book of all distress, emergency, navigation, and safety type of information. Note the date, time, call letters and names of all ships involved and the content of the message. The log book should be signed by the person making entries.
It is against the law to use profane or obscene language on the radio. Remember, you're transmitting on a party line.

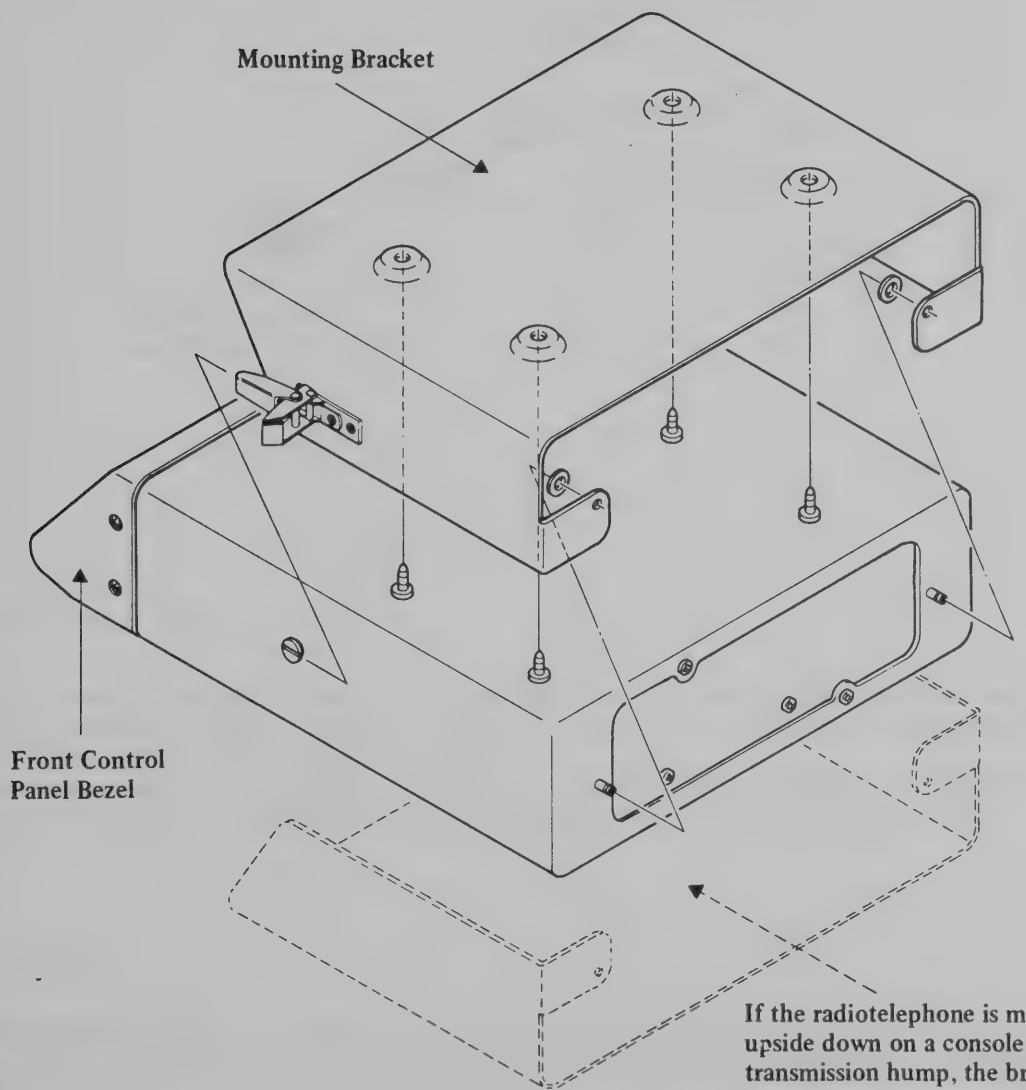
Installation

Location. Make sure the location chosen is one in which it is convenient to operate the unit. Also bear in mind that the microphone bracket will have to be mounted in the same general area.

Mounting-Bracket. The radiotelephone may be mounted to the underside of the instrument panel or dashboard of a boat, car, etc. by means of a special mounting bracket supplied with the radiotelephone. Attach the bracket to the location selected using four screws supplied.

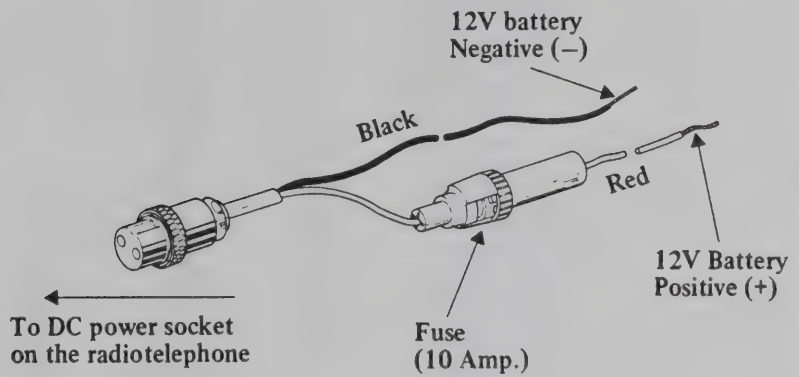
Radiotelephone installation to the bracket. Grasp the radiotelephone and insert the rear of the radiotelephone as shown. Gently push the radiotelephone backward so that the guide-pins on the rear of the radiotelephone mate with holes on the bracket. Do not force it.
Engage the snap fasteners to the metal lugs on both sides of the radiotelephone. Push the fastener latch to fix the radiotelephone securely. When removing the radiotelephone from the bracket, use reverse manner.

Overhead mounting. If you want to mount the radiotelephone overhead on the cockpit ceiling, etc. the mounting bracket should be mounted up side down on the ceiling. The front control panel bezel will also have to be reversed downward for an operating convenience. Ask your local Cybernet dealer for professional service.


Mounting Bracket
Front Control Panel Bezel
If the radiotelephone is mounted upside down on a console or transmission hump, the bracket must be reversed to mount the radiotelephone.

Power Connection

Important: This unit is designed for operation from 12-Volt negative ground electrical system. Do not attempt to use it in a positive ground system.
The DC power cable supplied is used to make the necessary DC voltage connections to boat's battery line. Choose a point which is capable of handling at least 6 amps (never use a lighting circuit, for example). The switched side of the ignition switch is usually a suitable point for the **positive (+)** 12 volt connection. Neatly run the power cable leads to this location. If you must extend the power leads, keep the wiring as short as possible, since long wires can cause a voltage drop which will affect the performance of the radiotelephone. Use #10 wire for extensions up to 10 feet and #8 wire for longer extensions.
Connect the **red** (fused) lead to the positive (+) battery line, and the black wire to the hull ground **(battery –)**, usually the same as the engine ground. In transceiver installations, the ground system is very important and has a great effect on communication range.
Reverse battery connections (reversing battery polarity) will automatically actuate the protection circuit in the unit and cause the fuse to blow, thus protecting the unit from damage. If the fuse blows, turn the power switch off and check reverse battery connection. Replace the fuse with one having **10A** rating, since any fuses higher than this value may cause damage to the radiotelephone.
The other end of the DC power cable is terminated with a screw-in type 2-pin plug. Always line up the keyway properly before pushing the power cable connector into the transceiver socket. Do not attempt to force the connector; when properly lined up, the connector can be inserted easily. Rotate the screw-ring on the plug to secure it to the socket.



Antenna Connection

Use a VHF marine antenna which meets the 50 ohm termination requirements. It should be mounted as high as possible for maximum range. Connect it to the antenna connector on the rear panel of the radiotelephone, using 50 ohm coaxial cable with a **PL-259** connector.
Since there are a large number of VHF marine antennas available, you should consult the dealer from whom you purchased the unit for further information on marine antennas that meet your specific needs.

AC Operation

Power Connection. The radiotelephone may be operated from 105 – 120V, 50/60 Hz AC when used with any AC power supply unit which meets the voltage and current requirements of the unit (13.6V DC, 6A or higher).
Simply connect the **red** lead in the unit's power cable to the **positive** DC terminal of the AC power supply unit and the **black** wire to the **negative** terminal.

COMPREHENSIVE VHF-FM MARINE RADIOTELEPHONE CHANNELS . . . by Designator

OPERATING CHANNEL DESIGNATIONS		FREQUENCY (MHz)		TYPE OF TRAFFIC	FUNCTION	
ORIGINAL	ADDITIONAL	SHIP TX	COAST TX		SHIP/SHIP	SHIP/SHORE
1		156.05	160.65	International Only	–	Yes
2		156.1	160.7	International Only	–	Yes
3		156.15	160.75	International Only	–	Yes
4		156.2	160.8	International Only	–	Yes
5		156.25	160.85	International Only	–	Yes
6		156.3	–	SAFETY	Yes	No
7		156.35	160.95	International Only	–	Yes
7A		156.35	156.35	Commercial	Yes	Yes
8		156.4	–	Commercial	Yes	No
9		156.45	156.45	Commercial	Yes	Yes
9		156.45	156.45	Non-Commercial	Yes	Yes
10		156.5	156.5	Commercial	Yes	Yes
11		156.55	156.55	Commercial	Yes	Yes
12		156.6	156.6	Port Operations, USCG	Yes	Yes
13		156.65	156.65	Locks, Canals, Pilots	Yes	Yes
14		156.7	156.7	Port Operations, USCG	Yes	Yes
15		156.75	156.75	Environ., Hydrographic	Ship Receive Only	Ship Receive Only
16		156.8	156.8	DISTRESS CALLING	Yes	DISTRESS CALL
17		156.85	156.85	State Control Restricted	No	Yes
18		156.9	161.6	International Only	Yes	Yes
18A		156.9	156.9	Commercial	Yes	Yes
19		156.95	161.55	International Only	Yes	Yes
19A		156.95	156.95	Commercial	Yes	Yes
20		157.0	161.6	Port Operations	No	Yes
21		157.05	161.65	International Only	–	Yes
21CG		157.05	157.05	USCG Restricted	Yes	Yes
22		157.1	161.7	International Only	–	Yes
22CG		157.1	157.1	USCG Restricted	Yes	Yes
23		157.15	161.75	International Only	–	Yes
23CG		157.15	157.15	USCG Restricted	Yes	Yes
24		157.2	161.8	Public Corresp.	No	Yes
25		157.25	161.85	Public Corresp.	No	Yes
26		157.3	161.9	Public Corresp.	No	Yes
27		157.35	161.95	Public Corresp.	No	Yes
28		157.4	162.0	Public Corresp.	No	Yes
	60	156.025	160.625	International Only	Ship Receive Only	Ship Receive Only
	61	156.075	160.675	International Only	"	"
	62	156.125	160.725	International Only	"	"
	63	156.175	160.775	International Only	"	"
	64	156.225	160.825	International Only	"	"
	65	156.275	160.875	International Only	Yes	Yes
	65A	156.275	156.275	Port Operations	Yes	Yes
	66	156.325	160.925	International Only	Yes	Yes
	66A	156.325	156.325	Port Operations	Yes	Yes
	67	156.375	–	Commercial	Yes	No
	68	156.425	156.425	Non-Commercial	Yes	Yes
	69	156.475	156.475	Non-Commercial	Yes	Yes
	70	156.525	–	Non-Commercial	Yes	No
	71	156.575	156.575	Non-Commercial	Yes	Yes
	72	156.625	–	Non-Commercial	Yes	No
	73	156.675	156.675	Port Operations	Yes	Yes
	74	156.725	156.725	Port Operations	Yes	Yes
	75	GUARD CHANNEL		–	–	–
	76	GUARD CHANNEL		–	–	–
	77	156.875	–	Commercial	Yes	No
	78	156.925	161.525	International Only	Yes	Yes
	78A	156.925	156.925	Non-Commercial Only	No	Yes
	79	156.975	161.575	International Only	Yes	Yes
	79A	156.975	156.975	Commercial	Yes	Yes
	80	157.025	161.625	International Only	Yes	Yes
	80A	157.025	157.025	Commercial	–	Yes
	81	157.075	161.675	International Only	–	Yes
	82	157.125	161.725	International Only	–	Yes
	83	157.175	161.775	International Only	–	Yes
	83CG	157.175	157.175	USCG Aux. Only	Yes	Yes
	84	157.225	161.825	Public Corresp.	No	Yes
	85	157.275	161.875	Public Corresp.	No	Yes
	86	157.325	161.925	Public Corresp.	No	Yes
	87	157.375	161.975	Public Corresp.	No	Yes
	88	157.425	162.025	International Only	Yes	Yes
	88A	157.425	–	Commercial	Yes	No
WE_1		–	162.55	NOAA Weather	Ship Receive Only	Ship Receive Only
	WE_2	–	162.4	NOAA Weather	"	"
WE_3		–	162.475	"	"	"
	WE_4	–	161.650	"	"	"

Check locally for Channels Authorized or used in your Area.

USA VHF-FM MARINE RADIOTELEPHONE CHANNELS . . . by Function

OPERATING CHANNEL DESIGNATORS		FREQUENCY (MHz)		POINTS OF COMMUNICATION	TYPE OF TRAFFIC
ORIGINAL	ADDITIONAL	SHIP TX	COST TX		
DISTRESS, SAFETY AND CALLING					
16		156.8	156.8	Ship/Ship, Ship/Shore	DISTRESS CALLING
INTERSHIP SAFETY					
6		156.3	156.3	Ship/Ship	SAFETY
NAVIGATIONAL BRIDGE TO BRIDGE					
13		156.65	156.65	Ship/Ship, Ship/Shore	Locks, Canals, Pilots, Bridges
ENVIRONMENTAL					
15		–	156.75	Shore to Ship, Rev Only	Environ., Hydrographic
STATE CONTROL					
17		156.85	156.85	Ship/Shore	RESTRICTED
PORT OPERATIONS					
12		156.6	156.6	Ship/Ship, Ship/Shore	USCG
14		156.7	156.7	"	USCG, Port Auth.
20		157.0	161.6	Ship/Shore Only	Port Operations, USA
	65A	156.275	156.275	Ship/Ship, Ship/Shore	"
	66A	156.326	156.325	"	"
	73	156.675	156.675	"	"
	74	156.725	156.725	"	"
COMMERCIAL					
7A		156.35	156.35	Ship/Ship, Ship/Shore	Commercial, USA
8		156.4	-	Ship/Ship Only	"
9		156.45	156.45	Ship/Ship, Ship/Shore	"
10		156.5	156.5	"	"
11		156.55	156.55	"	"
18A		156.9	156.9	"	"
19A		156.95	156.95	"	"
	67	156.375	–	Ship/Ship Only	Work boats
	77	156.875	–	"	Commercial, USA
	79A	156.975	156.975	Ship/Ship, Ship/Shore	"
	80A	157.025	157.025	"	"
	88A	157.425	–	Ship/Ship Only	Fishing Vessels
NON-COMMERCIAL					
9		156.45	156.45	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	68	156.425	156.425	Ship/Ship, Ship/Shore	Yachts
	69	156.475	156.475	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	70	156.525	–	Ship/Ship Only	Yachts
	71	156.575	156.575	Ship/Ship, Ship/Shore	Clubs, Marinas, Yards, etc.
	72	156.625	–	Ship/Ship Only	Yachts
	78A	156.925	156.925	Ship/Shore Only	Clubs, Marinas, Yards, etc.
	83CG	157.175	157.175	Ship/Ship, Ship/Shore	USCG Aux. Only
PUBLIC CORRESPONDENCE					
24		157.2	161.8	Ship/Public Coast	Telephone Corresp.
25		157.25	161.85	"	"
26		157.3	161.9	"	"
27		157.35	161.95	"	"
28		157.4	162.0	"	"
	84	157.225	161.825	"	"
	85	157.275	161.875	"	"
	86	157.325	161.925	"	"
	87	157.375	161.975	"	"
NOAA WEATHER SERVICE					
WE_1		–	162.55	Ship Receive Only	Weather Broadcasts
	WE_2	–	162.4	"	"
WE_3		–	162.475	Ship Receive Only	Weather Broadcasts
	WE_4	–	162.650	"	"

Check locally for Channels Authorized or used in your Area.

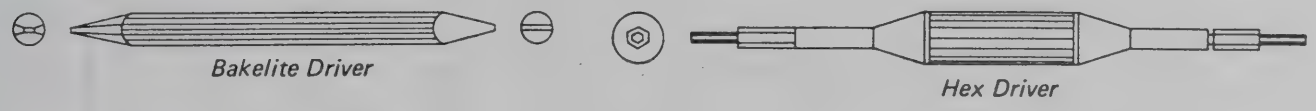
Alignment Procedure

The **CTX-7800** has been fully aligned at the factory before shipment to you and does not normally require further adjustment. When necessary, however, the unit may be aligned as indicated hereinafter. It is recommended that you do not try to adjust any circuit in this radiotelephone unless you entirely understand circuit operation and have enough experience in this field of marine radiotelephone and high quality test equipment. Since the radiotelephone is most precise and sophisticated, tampering with the unit may cause upsetting the alignment and lowers its performance.

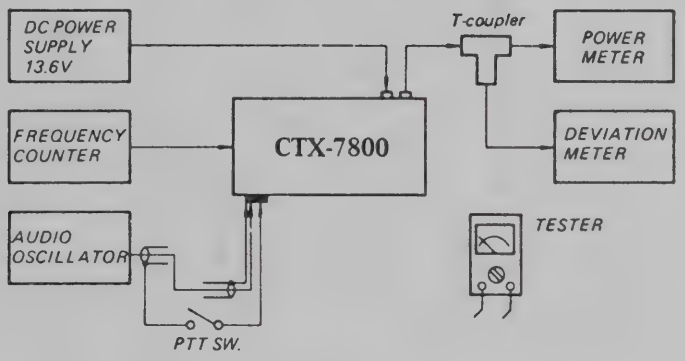
Equipment Required

Following equipment are required for the alignment.

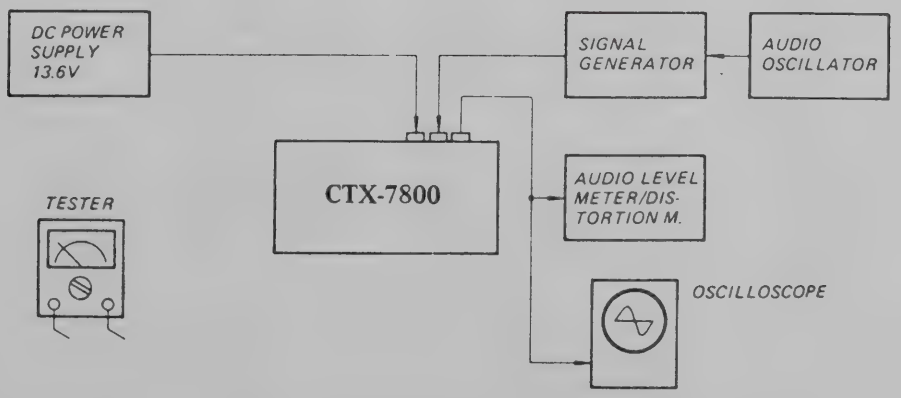
(1) Regulated DC Power Supply, 0 – 20V, 10A or higher.
(2) Audio Signal Generator, 10 Hz – 20 kHz.
(3) RF VTVM, Probe type, 150 MHz.
(4) Circuit Tester or Digital Voltmeter.
(5) Frequency Counter, 0 – 250 MHz, input sens. 50 mV, stability 5×10^{-8}.
(6) Deviation Meter.
(7) Synchroscope.
(8) RF Dummy Resistor, 50 ohms, 30W.
(9) RF Power Meter, 50 ohms impedance, 25W or higher.
(10) T-coupler.
(11) Drivers, as shown.



Transmitter Alignment Test Setup.



Receiver Alignment Test Setup



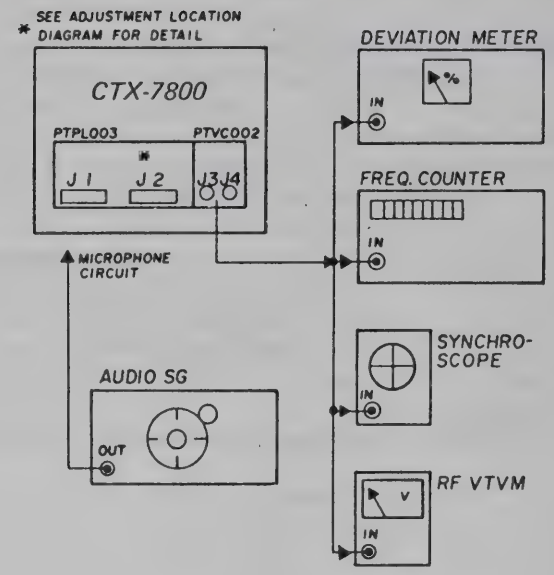
PLL Alignment (PTPL003) – TX alignment setup

STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	VR-2 (Squelch) T-1 (PTVC002)	TP-1	a. Before turning power on, check resistance between: Terminal 1 of Y- 9 (–) and ground (+) = 40 kOhm. Terminal 2 of Y-10 (–) and ground (+) = 80 kOhm. Terminal 5 of Y-10 (–) and ground (+) = 120 kOhm. b. Temporarily rotate VR-2 fully counterclockwise. Turn the power on (Select channel 06). Check voltage between pin No. 2 of U-4 and ground is 9V (±0.4V). c. Check voltage between pin No. 10 of Y-9 and ground is 7.5V (±0.4V). d. Connect tester between TP-1 and ground. Adjust T-1 on VCO PC Board (PTVC002) to obtain 1.5V ± 0.1V on tester.
2	12.8 MHz Oscillator CT-1 T-1 and T-3 T-2 and T-4	Pin No. 2 of U-2. Pin No. 5 of U-1. PLL output, Cathode of D-1 or D-2.	a. Connect frequency counter through a probe and 1 pF capacitor between pin No. 8 of U-2 and ground. Turn CT-1 to obtain reading of 3.225 MHz at channel 16 on the counter. b. Choose WX1. Connect synchroscope through the low-capacitance probe between pin No. 5 of U-1 and ground. Adjust T-1 to observe maximum scope display. Next, adjust T-3 to observe maximum scope display. Make sure that the oscillator is displaying clear 'peak-to-peak' wave. c. Choose CH16. Connect RF VTVM (or synchroscope) between PLL output, cathode of D-1 (or D-2), and ground. Adjust T-2 and T-4 on PLL PC Board (PTPL003) so that maximum 'peak-to-peak' output is observed.
3	Overall Frequency L-3	PLL output, Cathode of D-2.	Connect frequency counter between PLL output, D-2, and ground. Choose WX1. Adjust L-3 to obtain reading of 141.150200 MHz (±50 Hz).
4	Deviation RV-1	PLL output, Cathode of D-1.	Choose CH16. Connect deviation meter to VCO output, D-1, and connect signal generator to mic input circuit (pin No. 1 of mic jack J-6) and ground (pin No. 2 of J-6). Apply 1 kHz, 0.1V signal to the mic input circuit. Adjust RV-1 so that 4.5 kHz deviation is obtained on deviation meter.
5	VCO Oscillating Range Check T-1	Pin No. 5 of U-1/TP-1.	Choose CH06. Connect synchroscope between pin No. 5 of U-1 and ground. Connect frequency counter to vertical input terminals of synchroscope. Connect tester between TP-1 and chassis ground. The counter reading should be 2.725000 MHz (±10 Hz). Verify that tester is reading 1.5V. If not, adjust T-1. Next, verify that the frequency reading and tester reading at CHWX1. They should be 8.975000 MHz and 4.5V.

PLL Stage Alignment (PTPL003/PTVC002)

Equipment Required

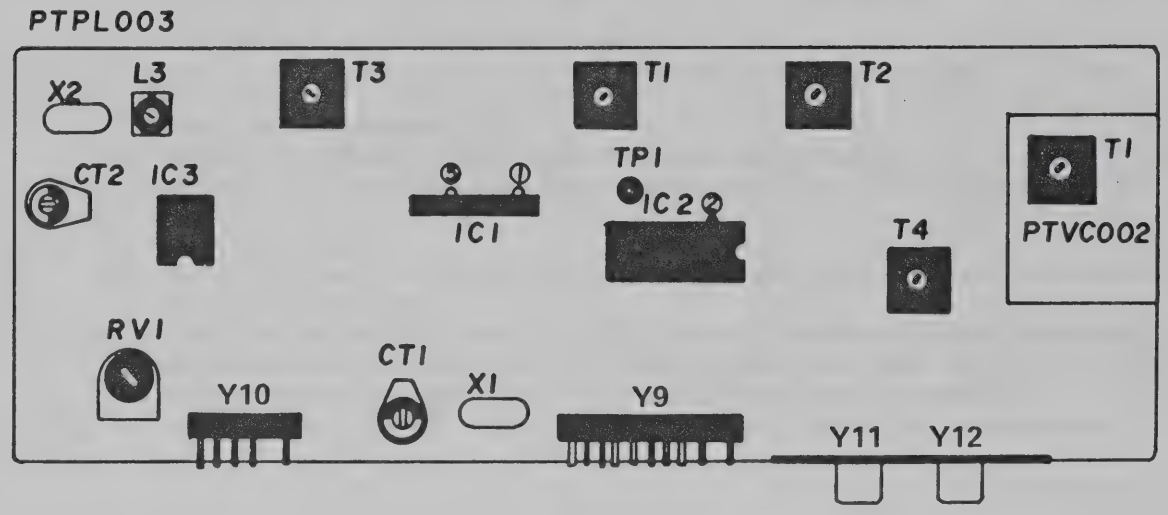
1) Bakelite driver.
2) Circuit tester, Sanwa A-303TR-DII or equivalent, or digital voltmeter.
3) Frequency counter, reference stability; 5 x 10^{-8} or more, 250 MHz, 50 mV.
4) Audio signal generator.
5) Deviation meter.
6) RF VTVM, 150 MHz or more.
7) Synchroscope, 50 MHz, equipped with low capacitance input probe.



Test Setup

Connect test equipment to the unit as shown:

Adjustment Locations



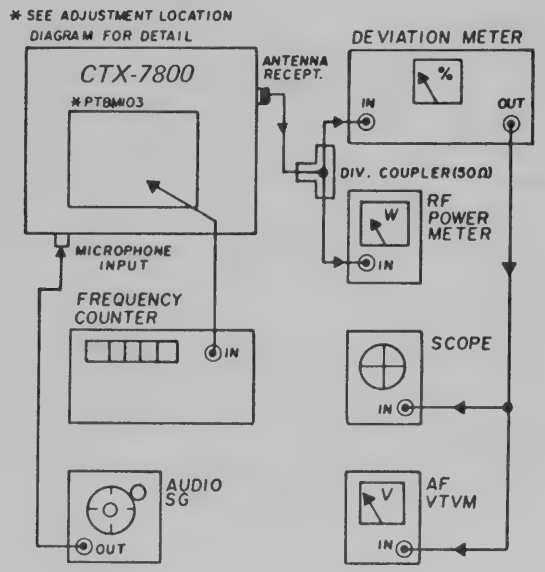
STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	T-1 (PTVC002)	TP1	a. Turn power on and select channel 06. b. Connect tester across TP1 (+) and chassis ground (–), with 12 volt range. Note that the use of a dc digital voltmeter (high input impedance in nature) is recommended in the place of tester here after. c. Adjust T1 (PTVC002) for 1.5V reading. Tolerance of ±0.1V is acceptable.
2	CT-1	Pin #2 of U-2	a. Connect frequency counter to the #8 of U-2, through low capacitive probe with 1 pF capacitor in series. b. Check that counter reads out 3.225 MHz, if not, adjust CT-1 with acceptable tolerance of ±5 Hz.
3	T-1 (PTPL003) T-3	Pin #5 of U-1 (R-2, 1 kOhm)	a. Select wather monitoring, US-1. (Depress W key then number key 7.) b. Connect scope to pin #5 of U-1 through a probe. c. Adjust T-1 for maximum scope display. This may cause the display slightly be blotted. d. Adjust T-3 so that the wave form becomes clear and not blotted on the display.
4		Y-11, Y-12 T-2, T-4	a. Select channel 16. b. Connect RF VTVM and synchroscope. Use RCA jacks for the convenience. The cathode side of D1 or D2 is likewise available. c. Adjust T-2 and T-4 for the maximum peak-to-peak wave form on the scope display.
5	VR-1	Y-11, Y-12	a. Select channel 16. b. Connect deviation meter to Y-11 or Y-12. c. Set the unit to transmit condition. d. Apply audio signal generator output to the microphone circuit with 100 mV, 1,000 Hz. e. Rotate VR-1 so that 4.5 kHz deviation is indicated on deviation meter. f. Check deviation on channel 28 for less than 5.0 kHz.
6	L-3	Y-11, Y-12	a. Connect frequency counter to Y-11 or Y-12. b. Select weather monitoring, US-1. c. Adjust L-3 to obtain 141.150200 MHz. Tolerance within ±50 Hz is acceptable. Note not to use CT-2 this time (This should be adjusted to compensate strays after installing the covering shield).
7		Pin #5 of U-1	a. Select channel 06. b. Connect frequency counter to pin #5 of U-1, using probe, and distribute scope's amplified output to frequency counter input. c. Check that voltage at test point (pin #5, U-1) increases proportionally as the channel selection goes up. Start with channel 06, making sure it is 1.5V at test point, if not, readjust T-1 on PTVC002. Finally, tester reading should reach to 4.5V at weather monitoring channel US-1.

Transmitter Stage (BTBM103)

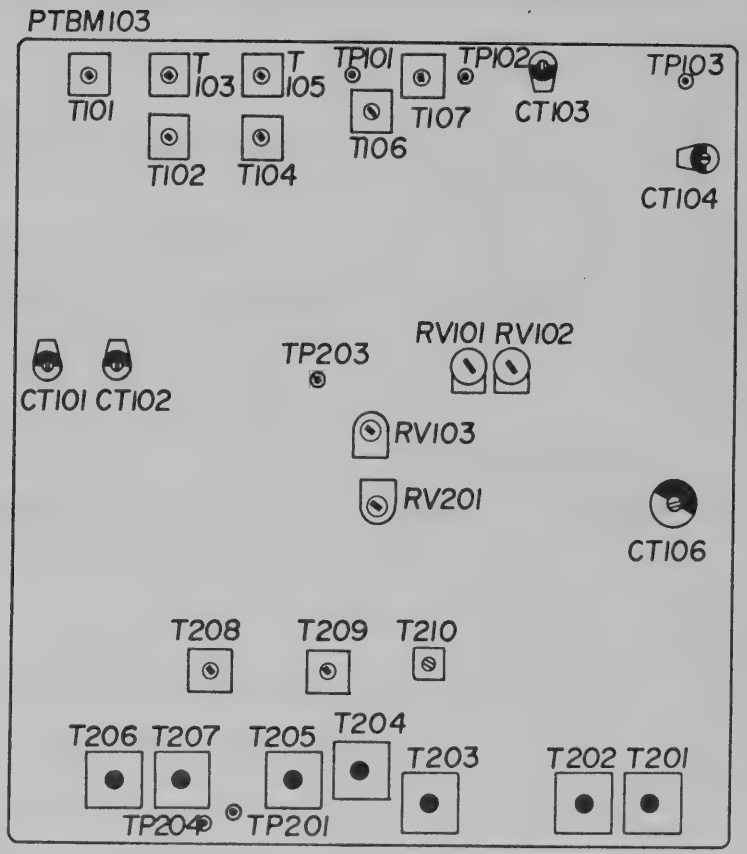
Equipment Required

1) Bakelite driver.
2) Hex bakelite driver.
3) Circuit tester or digital voltmeter.
4) Frequency counter.
5) Audio signal generator.
6) Deviation meter.
7) Antenna dummy load, 50 Ohm, 50 Watt, noninductive.
8) Audio oscilloscope.
9) Audio VTVM.
10) Regulated power supply, 0 to 35 Volt variable, more than 10 A.
11) Antenna dividing coupler.

Test Setup



Adjustment Location

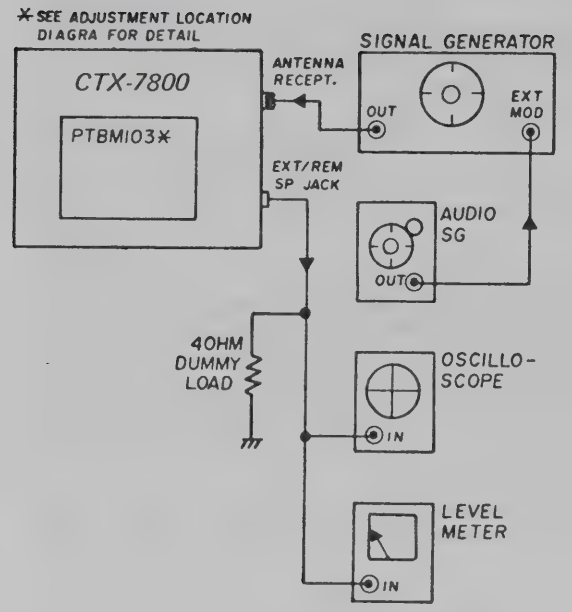


STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	T-101-T-105	TP-101	a. Turn power on and select channel 16. b. Turn the transmitter on by pressing the push-to-talk switch on the microphone or any. Set the Hi/Lo power switch to Hi (25W). c. Connect tester across TP-101 and chassis. d. Adjust T-101 through T-105 in turn to obtain maximum voltage on tester. This should be 1.4 to 1.6V.
2	T-106, 107 T-101 to T-105	TP-102	a. Remove tester to TP-102. b. Adjust T-106 and T-107 for maximum. c. Readjust T-101 through T-105 for maximum. This should be 0.28 to 0.34V.
3	CT-103	TP-103	a. Move tester to TP-103. b. Adjust CT-103 for maximum. This should be 0.25 to 0.27V.
4	CT-104 to T106		a. Adjust CT-104, 105, and 106 for maximum RF power meter reading. This should be 25W.
5	RV-102, 103		a. Set the Hi/Lo power switch to Hi position. b. Adjust RV-102 for 25W RF output. c. Align RF power meter pointer so that it coincides nearly high end of the stripe labelled Hi, using RV-103.
6	RV-101		a. Set the Hi/Lo power switch to Lo position. b. Adjust RV-101 for 0.8W RF output. c. Check that the RF power meter on the unit is staying in Lo stripe as shown.
7	CT-102 CT-101		a. Select channel 16. b. Adjust CT-102 for 156.800300 MHz with acceptable tolerance of ±50 Hz. c. Change channel to channel 20. d. Adjust CT-101 for 157.000300 MHz. Tolerance ±50 Hz is acceptable.
8	(Check)		Check unit in transmitting condition with different operating voltage range from 9.0 to 16.0V for no abnormal power increment or decrement.

Receiver Stage (PTBM103)

Equipment Required

Same as of Transmitter stage in addition to;
Speaker dummy load, 4 Ohm, 5 W.

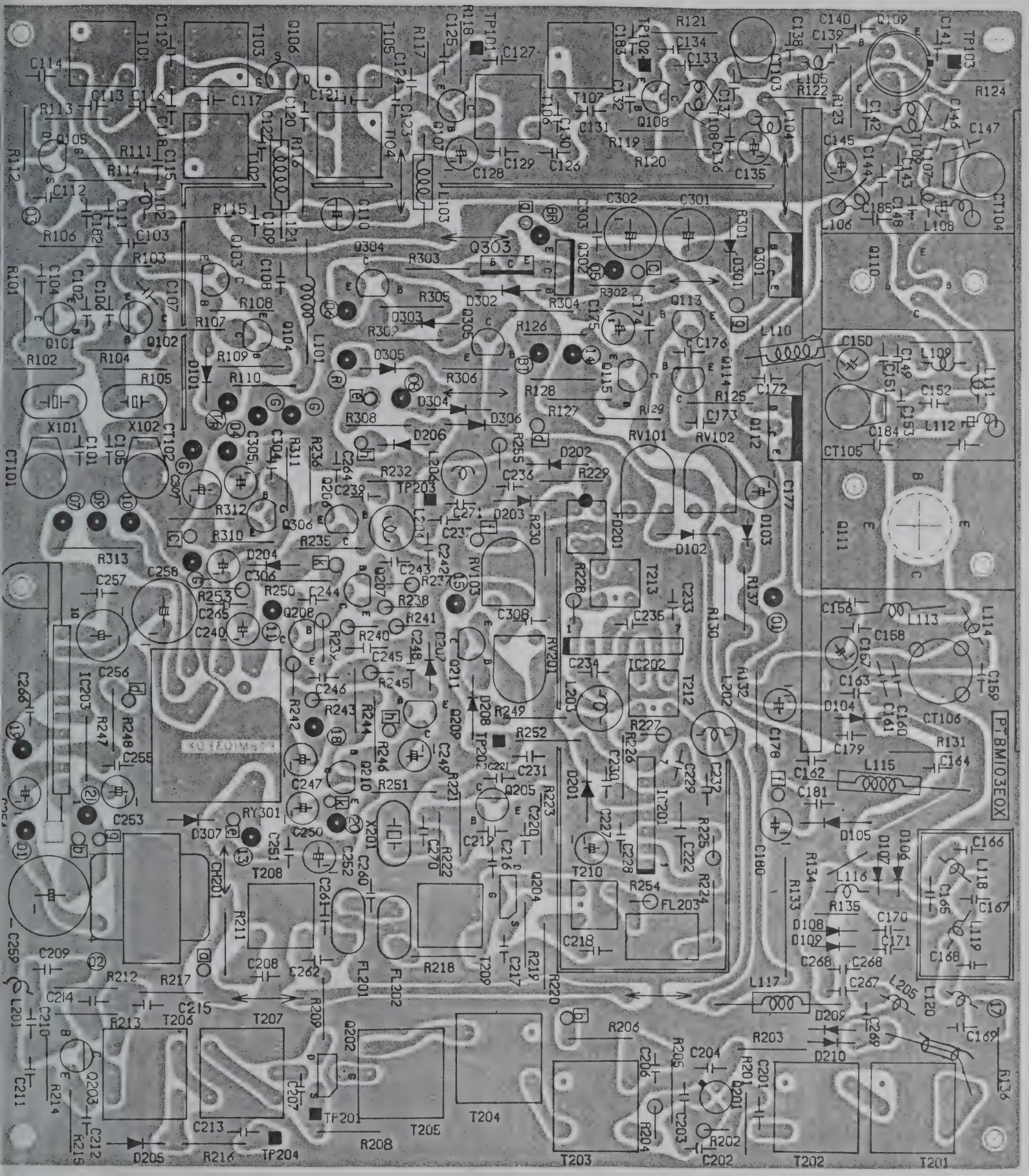


STEP	ADJUSTMENT	TEST POINT	PROCEDURE
1	T-206 T-207	TP-204 TP-201	a. Turn power on and select weather monitoring channel US-2. That is, depress W key, then US-2 (7). b. Connect tester across TP-204 and chassis. c. Adjust T-206 for maximum. (1.5 ~ 2.5V) d. Move tester to TP-201. e. Adjust T-207 for maximum. (1.5 ~ 3V) f. Repeat b. to e. twice at least.
2	T201–205, 208–210	TP-202	a. Apply signal generator output of 156.800 MHz with 70 dB level. b. Select channel 16, depressing direct access key 16. c. Connect test across TP-202 and adjust T-201 through T-205, and T-208 through T-210 for maximum. For the convenience, keep the tester indicating around 1.5V by reducing the generator output level.
3	T-205	TP-202	a. Select weather monitoring channel US-2 again, and retune the generator for 162.400 MHz. b. Adjust T-205 for maximum reading connected across TP-202 and chassis.
4	T208, 209, 210	TP-202	a. Set the generator to no signal output. b. Adjust T-208, 209 and 210 for maximum reading on tester connected to TP-202. c. Now 20 dB quieting sensitivity should be like less than 0.5 micro Volt.
5	RV-202 RV-201 RV-202 RV-201 T-205 T-205		a. Select channel 16 and tune generator to 156.800 MHz with 40 dB level. b. Set RV-202 to center position. c. Adjust RV-201 so that the meter pointer coincides with +30 dB label. d. Decrease generator output to 20 dB noise quieting point, then use RV-202 so that the pointer indicates S-2. e. Again adjust RV-201 for full scale indication. f. Check that the S-meter indicates S1 to S4 at channels 06, and US-2 with 20 dB noise quieting. g. If reading in channel 06 exceeds S4 while in channel US-2 falls below S1, turn T-205 core counter-clockwise (no farther than half a turn). h. If reading in channel US-2 exceeds S4 while in channel 06 falls below S1, turn T-205 core clockwise (no farther than half a turn). i. Check 20 dB noise quieting sensitivity for less than 0.5 micro-Volt.
6			a. Set the Squelch control fully clockwise (maximum). b. Check that the squelch opens within levels from 0.5 to 3.0 micro-Volt.
7			a. Apply signal generator output of 40 to 60 dB with 3.0 kHz deviation of 1 kHz audio to unit. b. Rotate the Volume control clockwise fully. c. Check that 4 Volt is delivered at Ext/Rem speaker jack.

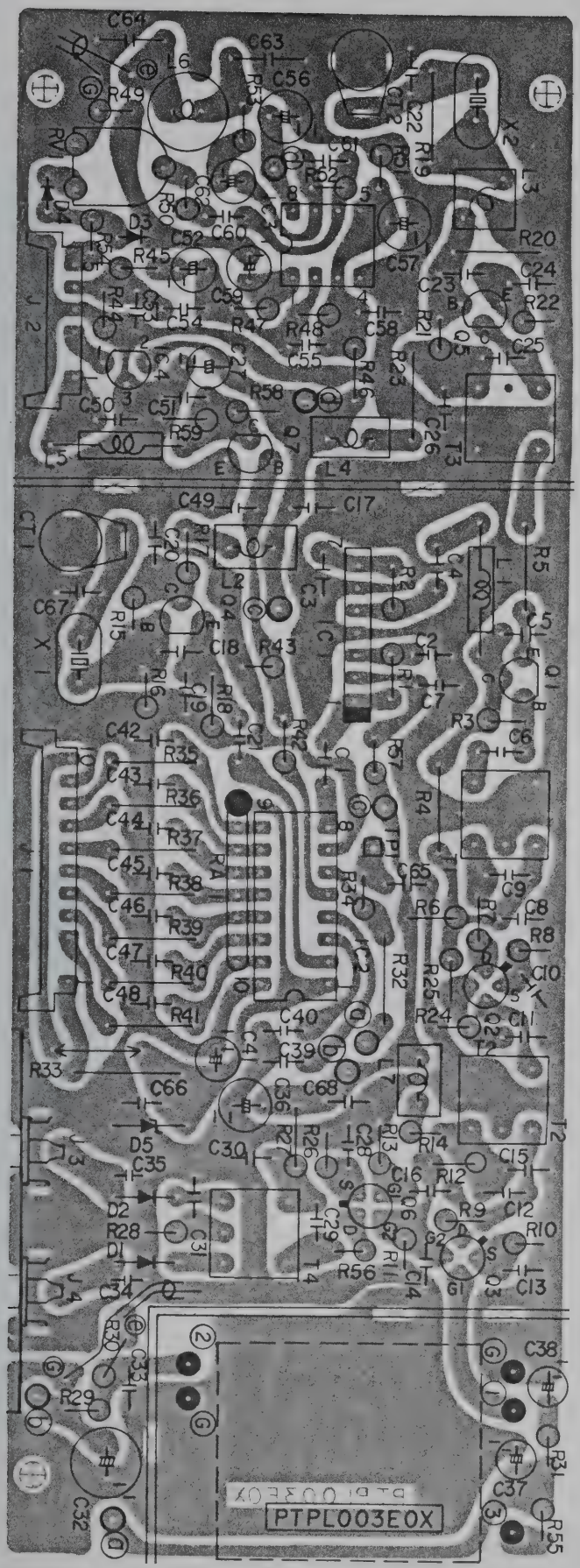
VCO Frequency to Channel Distribution

Channel	N Code	VCO Frequency (MHz)	Channel	N Code	VCO Frequency (MHz)	Channel	N Code	VCO Frequency (MHz)
6	109	2.725	26	333	8.325	76	130	3.250
7	295	7.375	27	335	8.375	77	132	3.300
7(US)	111	2.775	28	337	8.425	78	318	7.950
8	113	2.825	29	339	8.475	78(US)	134	3.350
9	115	2.875	U1	359	8.975	79	320	8.000
10	117	2.925	U2	353	8.825	79(US)	136	3.400
11	119	2.975	U3	356	8.905	80	322	8.050
12	121	3.025	C1	323	8.075	80(US)	138	3.450
13	123	3.075	1	283	7.075	81	324	8.100
14	125	3.125	2	285	7.125	81(US)	140	3.500
15	127	3.175	3	287	7.175	82	326	8.150
16	129	3.225	4	289	7.225	83	328	8.200
17	131	3.275	5	291	7.275	83C	144	3.600
18	317	7.925	65	292	7.300	84	330	8.250
18(US)	133	3.325	65(US)	108	2.700	85	332	8.300
19	319	7.975	66	294	7.350	86	334	8.350
19(US)	135	3.375	66(US)	110	2.750	87	336	8.400
20	321	8.025	67	112	2.800	88	338	8.450
21	323	8.075	68	114	2.850	88(US)	154	3.850
21(US)	139	3.475	69	116	2.900	89	340	8.500
22	325	8.125	70	118	2.950	60	282	7.050
22(US)	141	3.525	71	120	3.000	61	284	7.100
23	327	8.175	72	122	3.050	62	286	7.150
23(US)	143	3.575	73	124	3.100	63	288	7.200
24	329	8.225	74	126	3.150	64	290	7.250
25	331	8.275	75	128	3.200			

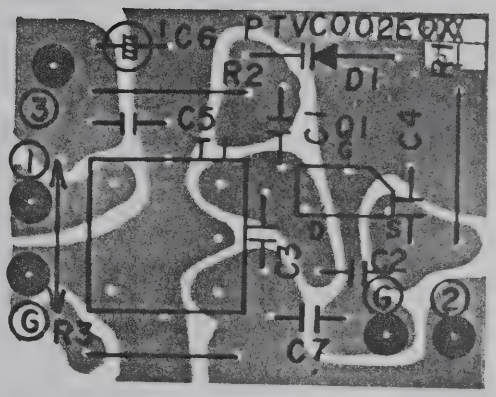
PTBM103



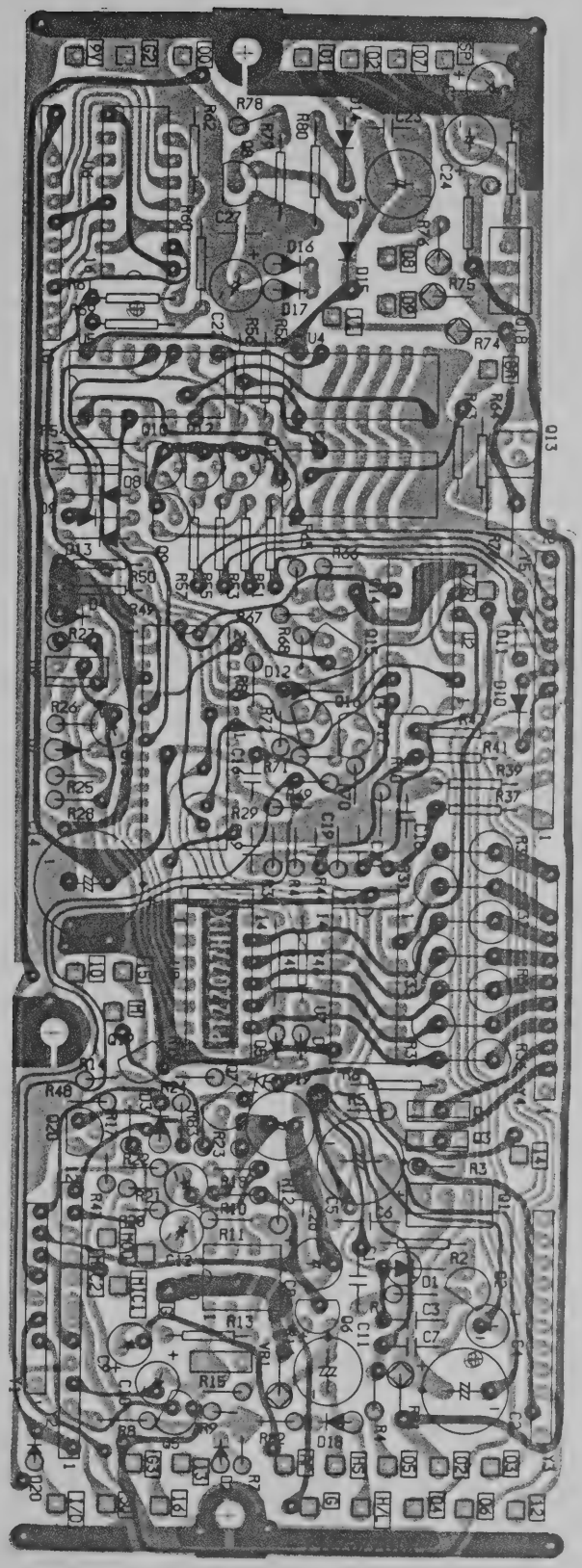
PTPL003



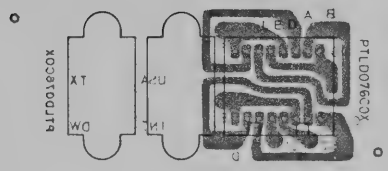
PTVC002



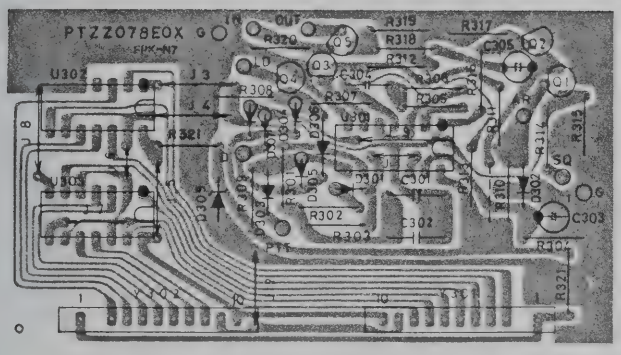
PTZZ077



PTLD076



PTZZ078



Replacement Part List

	PART NAME	PART CODE	
	ELEC. ELEMENTS	EMB55JAC4LJ	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		ACCND30GEA		CONN. CORD ASSY		P10				1
2		ACCN165GEA		CONN. CORD ASSY		P9				1
3		ACCN437GEA		CONN. CORD ASSY		P6				1
4		ACCN438GEA		CONN. CORD ASSY		P1				1
5		ACCN439GEA		CONN. CORD ASSY		P3				1
6		ACCN440GEA		CONN. CORD ASSY		P2				1
7	EXPLODED	APTBM103D1		P.W.BOARD ASSY						1
8	EXPLODED	APTLDC76AA		P.W.BOARD ASSY						1
9	EXPLODED	APTPL003BA		P.W.BOARD ASSY.						1
10	EXPLODED	APTVC002AA		P.W.BOARD ASSY.						1
11	EXPLODED	APTZZ077AA		P.W.BOARD ASSY						1
12	EXPLODED	APTZZ078AA		P.W.BOARD ASSY						1
13		CCDE030CCM		CERAMIC CAP.	CJ 3PF 500V -0.25, +0.25PF	C7				1
14		CCDE120KCM		CERAMIC CAP.	12PF 500V -10, +10% CH	C6				1
15		CKDB103PEM		CERAMIC CAP.	0.01MFD 50V -0, +100% E	C1	C11	C16	C17	7
16						C18	C8	C9		
17		CKDE102PEM		CERAMIC CAP.	1000PF 500V -0, +100% E	C12	C13	C14	C15	8
18						C2	C3	C4	C5	
19		CQMB104KEH		MYLAR CAPACITOR	0.1MFD 50V -10, +10%	C10				1
20		GTX7800A01		WIRES KIT						1
21		LA1GG0703A		RF COIL		L1				1

	PART NAME	PART CODE	
	ELEC. ELEMENTS	FMB55AACAL1	

ITEM	REMARKS	CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		MS325BC004		GND. WASHER						1
2		QDSSR3AM8E		SI-DIODE	SR3AM8	D1				1
3		RVNA203B0J		VR.		VR2				1
4		RVNB103A12		VR.		VR1/S1				1
5		RVQA502B02		V.R		VR3				1
6		SK1644A04M		KEY BORD Sw		S8				1
7		SP05FAX03A		PUSH SWITCH		S3				1
8		WDH807Z001		COAXIAL CABLE						1
9		WDH814Z001		COAXIAL CABLE						1
10		YJC02S003Z		COAXIAL JACK		J3				1
11		YJF24SC01Z		JACK		J7				1
12		YJS04S003Z		JACK		J4				1
13		YJT03S003Z		3P JACK		J5				1
14		YJZ02SC04Z		DC JACK		J1				1
15		YJZ04SC08Z		4P MIC JACK		J2	J6			2
16		YPP01S002Z		PIN PLUG.		P7	P8			2
17		ZMJ203CN19		METER 16B36L		M1				1
18		ZQA0570B03		SPEAKER	57-MM 8-OHM 1-WATTS	SP1				1
19		ZZZ00JC081		F-BRADE WIRE						2
20										
21										

	P.W.BOARD ASSY	PART CODE APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		BNHCL30NSN		NUT	M3, S-NI, THIN-TYPE					3
2		BSPB3C08NN		BIND HEAD SCREW	(+)BIT, M3 X 8 S-NI					3
3		BSPB3Q10NN		BIND HEAD SCREW	(+)BIT, M3 X 10 S-NI					2
4		BSPC3008NS		CEMS SCREW	(+)BIT, M3 X 8 BS-NI					1
5		BSPP30C6NT		PAN HEAD SCREW	(+)BIT, M3 X 6 PLASTIC					2
6		BSPU3006NN		THIN BIND SCREW	(+)BIT, M3 X 6 S-NI					1
7		BWP30704BN		TONGUED WASHER	3 M/M BS-NI					1
8		BWU30E55SW		IT. LOCK WASHER	INSIDE TCOTHED, 3 M/M S-ZN					8
9		CBD1B104MM		CERAMIC CAP.	0.1MFD 12.5V -20, +20%	C248				1
10		CBD1B204MM		CERAMIC CAP.	0.2MFD 12.5V -20, +20%	C265				1
11		CCDB0R5CAM		CERAMIC CAP.	AK 0.5PF 50V -0.25, +0.25PF	C116	C118	C121		3
12		CCDB010CCM		CERAMIC CAP.	CK 1PF 50V -0.25, +0.25PF	C216				1
13		CCDB170DPM		CERAMIC CAP.	PH 7PF 50V -0.5, +0.5PF	C119	C126			2
14		CCDB100DPM		CERAMIC CAP.	PF 10PF 50V -0.5, +0.5PF	C113				1
15		CCDB1J1KUM		CERAMIC CAP.	10CPF 50V -10, +10% UJ	C103				1
16		CCDB120KPM		CERAMIC CAP.	12PF 50V -10, +10% PH	C120				1
17		CCDB121KPM		CERAMIC CAP.	120PF 50V -10, +10% PH	C111	C262			2
18		CCDB150KPM		CERAMIC CAP.	15PF 50V -10, +10% PH	C117	C123			2
19		CCDB151KUM		CERAMIC CAP.	150PF 50V -10, +10% UJ	C219				1
20		CCDB221KPM		CERAMIC CAP.	220PF 50V -10, +10% PH	C261				1
21		CCDB221KUM		CERAMIC CAP.	22CPF 50V -10, +10% UJ	C102	C106			2

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	Q'TY USED
1		CCDB330KPM		CERAMIC CAP.	33PF 50V -10, +10% PH	C101 C105 C201	3
2		CCDB470KPM		CERAMIC CAP.	47PF 50V -10, +10% PH	C124 C182 C209 C210	5
3						C211	
4		CCDB510KPM		CERAMIC CAP.	51PF 50V -10, +10% PH	C271	1
5		CCDB680KCM		CERAMIC CAP.	68PF 50V -10, +10% CH	C112	1
6		CCDB680KPM		CERAMIC CAP.	68PF 50V -10, +10% PH	C230 C244 C270	3
7		CCDB680KUM		CERAMIC CAP.	68PF 50V -10, +10% UJ	C220	1
8		CCDE010CCM		CERAMIC CAP.		C130	1
9		CCDE040CUM		CERAMIC CAP.		C164	1
10		CCDE070DCM		CERAMIC CAP.	CH 7PF 500V -0.5, +0.5PF	C186	1
11		CCDE080DCM		CERAMIC CAP.		C160 C161 C268	3
12		CCDE100DCM		CERAMIC CAP.	CH 10PF 500V -0.5, +0.5PF	C133 C142	2
13		CCDE120KCM		CERAMIC CAP.	12PF 500V -10, +10% CH	C163	1
14		CCDE120KPM		CERAMIC CAP.	12PF 500V -10, +10% PH	C131	1
15		CCDE150KCM		CERAMIC CAP.	15PF 500V -10, +10% CH	C166 C267 C269	3
16		CCDE270KCM		CERAMIC CAP.	27PF 500V -10, +10% CH	C146 C148 C152 C159	7
17						C167 C168 C169	
18		CCDE390KPM		CERAMIC CAP.	39PF 500V -10, +10% PH	C138	1
19		CCDE470KCM		CERAMIC CAP.	47PF 500V -10, +10% CH	C153 C185	2
20		CCDE470KPM		CERAMIC CAP.		C132	1
21		CCDE560KCM		CERAMIC CAP.	56PF 500V -10, +10% CH	C184	1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	4PTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		CCDE63CKCM		CERAMIC CAP.	68PF 500V -10, +10% CH	C137	C139	C154	C155	4
2		CEAC101ZMN		ELYT. CAPACITOR	100MFD 10V MS	C311				1
3		CEAC470ZMN		ELYT. CAPACITOR		C256				1
4		CEAD100ZMN		ELYT. CAPACITOR	10MFD 16V MS	C247	C249	C253	C254	4
5		CEAD102ALX		ELYT. CAPACITOR	1000MFD 16V	C259				1
6		CEAD220ZMN		ELYT. CAPACITOR	22MFD 16V MS	C307				1
7		CEAD221ALX		ELYT. CAPACITOR	220MFD 16V	C258				1
8		CEAD330ZMN		ELYT. CAPACITOR	33MFD 16V MS	C110	C252	C272		3
9		CEAD470ZMN		ELYT. CAPACITOR	47MFD 16V MS	C301	C302			2
10		CEAE220ZMN		ELYT. CAPACITOR		C178				1
11		CEAE4R7ZMN		ELYT. CAPACITOR	4.7MFD 25V MS	C128	C135	C145	C150	8
12						C157	C177	C180	C227	
13		CEAG010ZMN		ELYT. CAPACITOR	1MFD 50V MS	C250				1
14		CKDB103KBU		CERAMIC CAP.	0.01MFD 50V -10, +10% B	C104	C107	C108	C109	33
15						C122	C136	C162	C165	
16						C172	C173	C174	C176	
17						C179	C181	C183	C202	
18						C203	C204	C206	C207	
19						C208	C212	C213	C214	
20						C215	C221	C251	C255	
21						C266	C273	C303	C308	

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1						C310				
2		CKDB222KBM		CERAMIC CAP.	2200PF 50V -10, +10% B	C114	C115	C125	C127	5
3						C129				
4		CKDE222KBM		CERAMIC CAP.		C134	C140	C141	C143	11
5						C144	C149	C151	C156	
6						C158	C170	C171		
7		CQMB103KEH		MYLAR CAPACITOR	0.01MFD 50V -10, +10%	C237	C239			2
8		CQMB104KEH		MYLAR CAPACITOR	0.1MFD 50V -10, +10%	C245	C257			2
9		CQMB222KEH		MYLAR CAPACITOR	2200PF 50V -10, +10%	C236	C242	C243		3
10		CQMB224KEH		MYLAR CAPACITOR	0.22MFD 50V -10, +10%	C222				1
11		CQMB393KEH		MYLAR CAPACITOR	0.039MFD 50V -10, +10%	C264				1
12		CQMB472KEH		MYLAR CAPACITOR	4700PF 50V -10, +10%	C246				1
13		CQMB473KEH		MYLAR CAPACITOR	0.047MFD 50V -10, +10%	C217	C218	C228	C229	9
14						C231	C232	C233	C234	
15						C235				
16		CSSE4R7MBC		TANTALUM CAP.	4.7MFD 25V -20, +20%	C274				1
17		CSSER68MBC		TANTALUM CAP.	0.68MFD 35V -20, +20%	C240				1
18		CTZA2C0K01		TRIMMER CAP.		CT106				1
19		CTZ72C0K01		TRIMMER CAP.		CT101	CT102	CT103	CT104	5
20						CT105				
21		FBR455F11M		CERAMIC FILTER		FL203				1

	PART NAME	PART CODE	
	P.W.B.(A-C) ASSY	APTBM1030A	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		FF21R4F01M		XTAL FILTER		FL201	FL202			2
2		FZB455A01M		CERAMIC FILTER		FD201				1
3		LA1FEC708A		RF COIL		L109				1
4		LA1FG07D1A		RF COIL		L201				1
5		LA1EN1131A		RF COIL		L101				1
6		LA1GE07D1A		RF COIL		L107				1
7		LA1GG07D3A		RF COIL		L116	L118	L119	L120	5
8						L205				
9		LCADA3038A		RF COIL		L115	L117			2
10		LDADB3622N		RF COIL		L103	L110			2
11		LDADD3604R		RF COIL		L104	L106			2
12		LF1C0KE02T		CHOKE COIL		L102	L121			2
13		LF202KB01S		RF COIL		L206				1
14		LF562KB01S		RF COIL		L204				1
15		LF681JC01K		RF COIL		L202	L203			2
16		LJ119H004W		CHOKE COIL		CH201				1
17		LL2CN1001A		RF COIL.		L111				1
18		LL2GM1001A		RF COIL		L105				1
19		LL2JR1001A		RF COIL		L114				1
20		LL2JR1401A		RF COIL		L113				1
21		LMBDC1502V		RF COIL		L112				1

	P.W.BOARD ASSY	PART CODE APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		LNBBC1504U		RF COIL		L108				1
2		LZ5RE1501Z		RF COIL		T108	T109			2
3		MB332SC001		SHEILD						1
4		ML354SC001		SHEILD						1
5		MS327AC004		HEAT SINK						1
6		MS625SX001		SHIELD						1
7		MT260AQC01		HEAT SINK						1
8		MU543AC001		HEAT SINK						1
9		MU633SC001		SHEILD						1
10		MU644AC001		HEAT SINK						1
11		MW201BS001		TERMINAL						22
12		MW401CX001		SHORT JUMPER	Jw-10					6
13		MW401CX003		SHORT JUMPER						2
14		MW401CXC04		SHORT JUMPER	Jw-5					1
15		MX326CS001		HEAT SINK						1
16		MX415SS001		CLAMPER						1
17		PTBM103EDX		PRINTED W.BOARD						1
18		QDG1N60XXT		GERMANIUM DIODE	1N60 NO-RANK	D105	D205			2
19		QDG1S34XXT		GERMANIUM DIODE	1S34 NO-RANK	D202	D203			2
20		QDSMA150XV		SILICON DIODE	MA150 VF=1.2V,VR=35V NO-RANK 24MIN	D201				1
21		QDSM1301XE		SILICON DIODE	M1301-01-A VR=80V NO-RANK 26MIN	D106	D107	D108	D109	4

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	CYBERNET PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		QDSN4448XZ		SILICON DIODE	1N4448 VRM=100V NO-RANK	D211				1
2		QDSS1555XT		SILICON DIODE	1S1555 VR=30 VRM=35 NO-RANK 26MIN	D101	D104	D204	D207	10
3						D209	D210	D302	D303	
4						D304	D305			
5		QDZMZ309CE		ZENER DIODE	MZ309C C-RANK	D301				1
6		QQM00555BA		I.C.	UPC555H	IC202				1
7		QQMJ0577AA		I.C.	UPC577F	IC201				1
8		QQM07222AT		I.C.	TA7222AP PACKAGE CYB.-MARK	IC203				1
9		QTA0456XZT		TRANSISTOR	2SA496 C,Y-RANK	Q303				1
10		QTA0733XAA		TRANSISTOR	2SA733 C-RANK	Q104	Q115			2
11		QTB0512XAN		TRANSISTOR	2SB512 P-RANK	Q112				1
12		QTC0458LCB		TRANSISTOR	2SB458LG C-RANK	Q211				1
13		QTC0496XAT		TRANSISTOR	2SC496 O,Y-RANK	Q302				1
14		QTC0763XAE		TRANSISTOR	2SC763 C,C-RANK	Q107				1
15		QTC0784XAT		TRANSISTOR	2SC784 BN-RANK	Q101	Q102	Q203	Q205	4
16		QTC0900XBA		TRANSISTOR	2SC900 F-RANK	Q207	Q208	Q209		3
17		QTC0945LAA		TRANSISTOR	2SC945L P,Q-RANK	Q103	Q113	Q114	Q206	5
18						Q210				
19		QTC0945XBA		TRANSISTOR	2SC945 Q-RANK	Q304	Q305			2
20		QTC2053XAE		TRANSISTOR	2SC2053 NC-RANK	Q108				1
21		QTD0235XAT		TRANSISTOR	2SC235 C,Y-RANK	Q301				1

	PART NAME	PART CODE	CUSTOMER STOCK NO.
	P.W.BOARD ASSY	APTBM1C30A	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		QTF0237XAM		TRANSISTOR	MRF237 NO-RANK (RF.PWR. 8W.MAX)	Q110				1
2		QTF0238XAM		TRANSISTOR	MRF238 NO-RANK (RF.PWR. 30W.MAX)	Q111				1
3		QTK0023AAS		TRANSISTOR	2SK23A S40	Q202	Q204			2
4		QTK0120XAS		TRANSISTOR	2SK120 2-RANK	Q106				1
5		QTK0125XAS		TRANSISTOR	2SK125 S-RANK	Q105				1
6		QTL3N201BM		TRANSISTOR	3N201B	Q201				1
7		QTN4427XAM		TRANSISTOR	2N4427 NO-RANK	Q109				1
8		QVCSV02XXD		VARISTOR	SV02 NO-RANK	D102				1
9		QVFSV04XXD		VARISTOR	SVC4 NO-RANK (VF:2.10-2.60V)	D103				1
10		RC18GK104X		FIXED CARBON R.	1/8W 100K OHM 10%	R134	R135			2
11		RD25PJ100X		CARBON FILM R.	0.25W 10 OHM 5%	R209	R218	R224	R226	4
12		RD25PJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R103	R107	R206	R211	7
13						R217	R236	R251		
14		RD25PJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R108	R114	R130	R212	6
15						R250	R309			
16		RD25PJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R201	R248			2
17		RD25PJ151X		CARBON FILM R.	0.25W 150 OHM 5%	R117				1
18		RD25PJ152X		CARBON FILM R.	0.25W 1.5K OHM 5%	R137	R302			2
19		RD25PJ153X		CARBON FILM R.	0.25W 15K OHM 5%	R128	R213	R221	R249	4
20		RD25PJ2R2X		CARBON FILM R.	0.25W 2.2 OHM 5%	R124				1
21		RD25PJ220X		CARBON FILM R.	0.25W 22 OHM 5%	R113				1

	PART NAME	PART CODE	
	P.W.BCARD ASSY	APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		RD25PJ221X		CARBON FILM R.	0.25W 220 OHM 5%	R123				1
2		RD25PJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R110	R112	R127	R208	8
3						R223	R304	R305	R306	
4		RD25PJ223X		CARBON FILM R.	0.25W 22K OHM 5%	R129	R232	R246		3
5		RD25PJ224X		CARBON FILM R.	0.25W 220K OHM 5%	R235				1
6		RD25PJ272X		CARBON FILM R.	0.25W 2.7K OHM 5%	R122				1
7		RD25PJ331X		CARBON FILM R.	0.25W 330 OHM 5%	R119	R203	R215	R220	4
8		RD25PJ332X		CARBON FILM R.	0.25W 3.3K OHM 5%	R219	R303			2
9		RD25PJ391X		CARBON FILM R.	0.25W 390 OHM 5%	R116	R125			2
10		RD25PJ4R7X		CARBON FILM R.	0.25W 4.7 OHM 5%	R121	R247			2
11		RD25PJ470X		CARBON FILM R.	0.25W 47 OHM 5%	R115				1
12		RD25PJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R102	R105	R109	R120	7
13						R214	R216	R222		
14		RD25PJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R111	R136	R205		3
15		RD25PJ474X		CARBON FILM R.	0.25W 470K OHM 5%	R244				1
16		RD25PJ560X		CARBON FILM R.	0.25W 56 OHM 5%	R131				1
17		RD25PJ562X		CARBON FILM R.	0.25W 5.6K OHM 5%	R229	R230			2
18		RD25PJ680X		CARBON FILM R.	0.25W 68 OHM 5%	R118				1
19		RD25PJ681X		CARBON FILM R.	0.25W 680 OHM 5%	R106				1
20		RD25PJ682X		CARBON FILM R.	0.25W 6.8K OHM 5%	R101	R104			2
21		RD25PJ823X		CARBON FILM R.	0.25W 82K OHM 5%	R126				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM103D0	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		RD25TJ333X		CARBON FILM R.	0.25W 33K OHM 5%	R256				1
2		RD25TJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R313				1
3		RD25TC000D		CARBON R.						1
4		RD25VJ100X		CARBON FILM R.	0.25W 10 OHM 5%	R204	R228			2
5		RD25VJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R240				1
6		RD25VJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R227	R255			2
7		RD25VJ152X		CARBON FILM R.	0.25W 1.5K OHM 5%	R225	R238	R243	R245	5
8						R254				
9		RD25VJ153X		CARBON FILM R.	0.25W 15K OHM 5%	R253				1
10		RD25VJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R241	R242			2
11		RD25VJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R202				1
12		RD25VJ563X		CARBON FILM R.	0.25W 56K OHM 5%	R237				1
13		RD25VJ682X		CARBON FILM R.	0.25W 6.8K OHM 5%	R239				1
14		RGHAPJ102B		M-OXIDE FILM R.	1/2W 1K OHM 5%	R132				1
15		RGHAPJ221B		M-OXIDE FILM R.	1/2W 220 OHM 5%	R301				1
16		RG2ANJ820B		M-OXIDE FILM R.	2W 82 OHM 5%	R133				1
17		RPGNB10301		SEMI-FIXED VR.	10K OHM B-CURVE	RV201				1
18		RPGNB20301		SEMI-FIXED VR.	20K OHM B-CURVE	RV103				1
19		RPGNB20402		SEMI-FIXED VR.	200K OHM B-CURVE	RV202				1
20		RPGNB30301		SEMI-FIXED VR.		RV101				1
21		RPGNB50303		SEMI-FIXED VR.	50K OHM B-CURVE	RV102				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		TR07LA004N		I.F.T.		T210				1
2		TR07LAC14S		RF COIL		T212	T213			2
3		TR10GP004S		RF COIL		T101	T102	T103	T104	5
4						T105				
5		TR10GZC09M		RF COIL		T107				1
6		TR10GZ010M		RF COIL		T106				1
7		TR10MD005S		RF TRANS		T209				1
8		TR10MR007S		I.F.T.		T208				1
9		TR13GJC01S		RF COIL		T201				1
10		TR13GM003S		RF COIL		T202				1
11		TR13GM005S		RF COIL		T203				1
12		TR13GM007S		RF COIL		T204				1
13		TR13GM009S		RF COIL		T205				1
14		TR13GM011S		RF COIL		T206				1
15		TR13GM013S		RF COIL		T207				1
16		VS801XA001		MICA SHEET						2
17		VT220SX001		TERMINAL						7
18		WDD813Z001		COAXIAL CABLE						1
19		WTG112EEXX		SOLID WIRE						1
20		WTG223EEXX		SOLID WIRE						1
21		WTG320EEXX		SOLID WIRE						1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTBM103DA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		WTG421EEXX		SOLID WIRE			1
2		WTG514EEXX		SOLID WIRE			1
3		WTG611EEXX		SOLID WIRE			1
4		WTG711EEXX		SOLID WIRE			1
5		WTG920EEXX		SOLID WIRE			1
6		XAZ1A6001X		XTAL OSCILLATOR	HC-18/U 16.800MHZ	X102	1
7		XAZ1A6002X		XTAL OSCILLATOR	HC-18/U 20.945MHZ	X201	1
8		XAZ1A6003X		XTAL OSCILLATOR	HC-18/U 21.400MHZ	X101	1
9		YFLCCC0034		FERRITE BEAD			3
10		ZZZ0000092		F-BRAID WIRE			2
11		ZZZ0000162		FUBRAID WIRE	L=15 W=4		1
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTLD076AA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		ACCN436GEA		CONN. CORD ASSY						1
2		BTPP2606AN		PAN TAP SCREW	(+)BIT. M2.6 X 6 S-NI					2
3		PTLD076CDX		PRINTED W.BOARD						1
4		QLEL22715C		LED	CTX-5500	LED601				1
5		VK122RW001		LAMP HOLDER						2
6		ZPA064137U		LAMP		PL603	PL604			2
7		ZPA064138U		LAMP		PL601	PL602			2
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										

	PART NAME	PART CODE	
	P.W.BOARD ASSY.	APTPL003BA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		CBD1B104MM		CERAMIC CAP.	0.1MFD 12.5V -20, +20%	C2	C3	C4		3
2		CCCBQ20CPM		CERAMIC CAP.	PK 2PF 50V -0.25, +0.25PF	C16				1
3		CCCBO60DPM		CERAMIC CAP.	PH 6PF 50V -0.5, +0.5PF	C9				1
4		CCCBO80DPM		CERAMIC CAP.	PH 8PF 50V -0.5, +0.5PF	C12				1
5		CCCB100DCM		CERAMIC CAP.	CH 10PF 50V -0.5, +0.5PF	C25				1
6		CCCB100DPM		CERAMIC CAP.	PH 10PF 50V -0.5, +0.5PF	C29				1
7		CCCB150KOM		CERAMIC CAP.	15PF 50V -10, +10% SL	C34	C35			2
8		CCDB150KCM		CERAMIC CAP.	15PF 50V -10, +10% CH	C23				1
9		CCDB220KPM		CERAMIC CAP.	22PF 50V -10, +10% PH	C22				1
10		CCDB221KPM		CERAMIC CAP.	220PF 50V -10, +10% PH	C18				1
11		CCDB390KOM		CERAMIC CAP.	39PF 50V -10, +10% SL	C5				1
12		CCDB470KPM		CERAMIC CAP.	47PF 50V -10, +10% PH	C24	C67			2
13		CCDB680KPM		CERAMIC CAP.	68PF 50V -10, +10% PH	C19				1
14		CEAC101ALX		ELYT. CAPACITOR	100MFD 10V	C32				1
15		CEAC330ALX		ELYT. CAPACITOR	33MFD 10V	C56	C57			2
16		CEAD100ALX		ELYT. CAPACITOR	10MFD 16V	C41				1
17		CEAD330ALX		ELYT. CAPACITOR	33MFD 16V	C36				1
18		CEAE4R7ALX		ELYT. CAPACITOR	4.7MFD 25V	C52	C59	C62		3
19		CKCB222KBM		CERAMIC CAP.	2200PF 50V -10, +10% B	C21	C53	C55	C58	4
20		CKDB103KBU		CERAMIC CAP.	0.01MFD 50V -10, +10% B	C1	C10	C11	C13	29
21						C14	C15	C17	C20	

	PART NAME	PART CODE	
	P.W.BOARD ASSY.	APTPLQ03BA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1						C26	C28	C30	C31	
2						C33	C42	C43	C44	
3						C45	C46	C47	C48	
4						C49	C50	C51	C6	
5						C65	C66	C68	C7	
6						C8				
7		CQMB103KEH		MYLAR CAPACITOR	0.01MFD 50V -10, +10%	C39	C40	C54		3
8		CQMB104KEH		MYLAR CAPACITOR	0.1MFD 50V -10, +10%	C63	C64			2
9		CQMB122KEH		MYLAR CAPACITOR	1200PF 50V -10, +10%	C61				1
10		CQMB153KEH		MYLAR CAPACITOR	0.015MFD 50V -10, +10%	C60				1
11		CSSF1C0M1C		TANTALUM CAP.	1CMFD 35V -20, +20%	C27				1
12		CSSF100M0N		TANTALUM CAP.	10MFD 35V -20, +20%	C38				1
13		CSSF2R2M0N		TANTALUM CAP.	2.2MFD 35V -20, +20%	C37				1
14		CTZ72C0K01		TRIMMER CAP.		CT1	CT2			2
15		LF100KE02T		CHOKE COIL		L1	L5			2
16		LF563JC02S		RF COIL		L6				1
17		LF680K001N		RF COIL		L2	L4	L7		3
18		MW401CX001		SHORT JUMPER	JW-10					1
19		PTPLCC3E0X		PRINTED W.BOARD						1
20		QDSMC301XE		SILICON DIODE	MC301 VR=30V NO-RANK 26MIN	D1	D2			2
21		QDSVJ6CXXB		SILICON DIODE	VJ6C VRM=200 29MIN	D3	D4			2

	PART NAME	PART CODE	
	P.W.BOARD ASSY.	APTPL003BA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		QDZMZ307CE		ZENER DIODE	MZ307-C VZ=7.0-7.6V C-RANK26MIN	D5				1
2		QQM005558A		I.C.	UPC555F	IC1				1
3		QQM04553AJ		I.C.	NJM4558D OPERATIONAL AMP.	IC3				1
4		QQM78L09AT		I.C.	TA78L09AP	IC4				1
5		QQDPLL07AN		I.C.	PLL07A(MN6143) MARINE PLL	IC2				1
6		QTC0710XBE		TRANSISTOR	2SC710 D-RANK	Q4	Q7			2
7		QTC0763XBE		TRANSISTOR	2SC763 C-RANK	Q1	Q5			2
8		QTL3N201BM		TRANSISTOR	3N201B	Q2	Q3	Q6		3
9		RAB472K07N		R ARRAY		RA1				1
10		RC14GK153X		FIXED CARBON R.	1/4W 15K OHM 10%	R21				1
11		RC14GK220X		FIXED CARBON R.	1/4W 22 OHM 10%	R56				1
12		RC14GK331X		FIXED CARBON R.	1/4W 330 OHM 10%	R28				1
13		RD25PJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R35	R36	R37	R38	7
14						R39	R40	R41		
15		RD25PJ152X		CARBON FILM R.	0.25W 1.5K OHM 5%	R4				1
16		RD25PJ331X		CARBON FILM R.	0.25W 330 OHM 5%	R23				1
17		RD25PJ562X		CARBON FILM R.	0.25W 5.6K OHM 5%	R20				1
18		RD25PJ680X		CARBON FILM R.	0.25W 68 OHM 5%	R5				1
19		RD25PJ682X		CARBON FILM R.	0.25W 6.8K OHM 5%	R32				1
20		RD25RJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R19				1
21		RD25TJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R60				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY.	APTPL003BA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		RD25VJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R10	R14	R27	R29	7
2						R57	R6	R8		
3		RD25VJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R2	R58			2
4		RD25VJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R48	R50			2
5		RD25VJ104X		CARBON FILM R.	0.25W 100K OHM 5%	R13	R54			2
6		RD25VJ125X		CARBON FILM R.	0.25W 1.2M OHM 5%	R47				1
7		RD25VJ150X		CARBON FILM R.	0.25W 15 OHM 5%	R17				1
8		RD25VJ152X		CARBON FILM R.	0.25W 1.5K OHM 5%	R18	R22			2
9		RD25VJ154X		CARBON FILM R.	0.25W 150K OHM 5%	R3				1
10		RD25VJ181X		CARBON FILM R.	0.25W 180 OHM 5%	R31				1
11		RD25VJ220X		CARBON FILM R.	0.25W 22 OHM 5%	R26	R7	R9		3
12		RD25VJ221X		CARBON FILM R.	0.25W 220 OHM 5%	R53				1
13		RD25VJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R43	R59			2
14		RD25VJ223X		CARBON FILM R.	0.25W 22K OHM 5%	R34	R52			2
15		RD25VJ272X		CARBON FILM R.	0.25W 2.7K OHM 5%	R46				1
16		RD25VJ273X		CARBON FILM R.	0.25W 27K OHM 5%	R11	R16	R24		3
17		RD25VJ331X		CARBON FILM R.	0.25W 330 OHM 5%	R30				1
18		RD25VJ332X		CARBON FILM R.	0.25W 3.3K OHM 5%	R51				1
19		RD25VJ393X		CARBON FILM R.	0.25W 39K OHM 5%	R45				1
20		RD25VJ471X		CARBON FILM R.	0.25W 470 OHM 5%	R55				1
21		RD25VJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R42	R49			2

	PART NAME	PART CODE	
	P.W.BOARD ASSY.	APTPL0038A	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		RD25VJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R12 R15 R25	3
2		RD25VJ681X		CARBON FILM R.	0.25W 680 OHM 5%	R1 R44	2
3		RGHANJ151B		M-OXIDE FILM R.	1/2W 150 OHM 5%	R33	1
4		RPGNB5D203		SEMI-FIXED VR.	5K OHM B-CURVE	RV1	1
5		TR07GZC05S		RF COIL		L3	1
6		TR10GNC01S		RF COIL		T4	1
7		TR10GPC03S		RF COIL		T1 T2 T3	3
8		VQ331MB002		ONGE			1
9		VT220SX001		TERMINAL		TP1	1
10		WSG530JJJJ		SHIELDED WIRE			1
11		WTG212EEXX		SOLID WIRE			1
12		WTG407EEXX		SOLID WIRE			1
13		WTG607EEXX		SOLID WIRE			1
14		WTG911EEXX		SOLID WIRE			1
15		XAS1C5C05X		XTAL OSCILLATOR	HC-43/U 12.800MHZ	X1	1
16		XAZ3A1001X		XTAL OSCILLATOR	HC-18/U 44.05833MHZ	X2	1
17		YJF05S001Z		JUNCTION JACK		J2	1
18		YJF10SC03Z		JUNCTION JACK		J1	1
19		YJP02SC09U		2P PIN JACK		J3,4	1
20							
21							

	PART NAME	PART CODE	
	P.W.BOARD ASSY.	APTVC0C2AA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	Q'TY USED
1		CCCB030CCM		CERAMIC CAP.	CJ 3PF 50V -0.25, +0.25PF	C2	1
2		CCCB040CPM		CERAMIC CAP.	PH 4PF 50V -0.25, +0.25PF	C3	1
3		CCCB050DCM		CERAMIC CAP.	CH 5PF 50V -0.5, +0.5PF	C4	1
4		CCCB100DCM		CERAMIC CAP.	CH 10PF 50V -0.5, +0.5PF	C1	1
5		CKDB103PEM		CERAMIC CAP.	0.01MFD 50V -0, +100% E	C5 C7	2
6		CSSF010MDN		TANTALUM CAP.	1MFD 35V -20, +20%	C6	1
7		MW401CX001		SHORT JUMPER	JW-10		1
8		PTVC002E0X		PRINTED W.BOARD			1
9		QDCBB122XQ		VARI-CAP. DIODE	8B-122 28V NO-RANK 26MIN	D1	1
10		QTK0023AAS		TRANSISTOR	2SK23A 540	Q1	1
11		RD25RJ273X		CARBON FILM R.	0.25W 27K OHM 5%	R2	1
12		RD25RJ334X		CARBON FILM R.	0.25W 330K OHM 5%	R3	1
13		RD25RJ392X		CARBON FILM R.	0.25W 3.9K OHM 5%	R1	1
14		TR10GP001S		RF COIL		T1	1
15		WYR004CCAA		STRANDED WIRE		N04 N05	2
16		WYR104CCAA		STRANDED WIRE		N01	1
17		WYR204CCAA		STRANDED WIRE		N02	1
18		WYR304CCAA		STRANDED WIRE		N03	1
19							
20							
21							

	PART NAME		
	P.W.BOARD ASSY	APTZZ077AA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		BSPP3005NT		PAN HEAD SCREW	(+)BIT, M3 X 5 PLASTIC					1
2		CBD1B104MM		CERAMIC CAP.	0.1MFD 12.5V -20, +20%	C23	C7			2
3		CBD1E473MM		CERAMIC CAP.	0.047MFD 25V -20, +20%	C1	C3	C6		3
4		CCCB470KPM		CERAMIC CAP.	47PF 50V -10, +10% PH	C16				1
5		CEAC330ALX		ELYT. CAPACITOR	33MFD 10V	C8				1
6		CEAD1C0ALX		ELYT. CAPACITOR	1CMFD 16V	C4				1
7		CEAD1D1ALX		ELYT. CAPACITOR	100MFD 16V	C11	C21	C24		3
8		CEAD102ALX		ELYT. CAPACITOR	1000MFD 16V	C14				1
9		CEAD220ALX		ELYT. CAPACITOR	22MFD 16V	C22				1
10		CEAD221ALX		ELYT. CAPACITOR	220MFD 16V	C2				1
11		CEAD330ALX		ELYT. CAPACITOR	33MFD 16V	C25				1
12		CEAD471ACX		ELYT. CAPACITOR	470MFD 16V S-SERIES	C5				1
13		CEAE470ALX		ELYT. CAPACITOR	47MFD 25V	C28				1
14		CEAG010ALX		ELYT. CAPACITOR	1MFD 50V	C10	C9			2
15		CEAG2R2ALX		ELYT. CAPACITOR	2.2MFD 50V	C15				1
16		CEAG4R7ALX		ELYT. CAPACITOR	4.7MFD 50V	C12	C13			2
17		CKDB103PEM		CERAMIC CAP.	0.01MFD 50V -0, +100% E	C17	C18	C19	C20	5
18						C27				
19		CQMB103KEH		MYLAR CAPACITOR	0.01MFD 50V -10, +10%	C26				1
20		CQMB561KEH		MYLAR CAPACITOR	560PF 50V -10, +10%	C29	C30			2
21		ML321AD001		HEAT SINK						1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTZZ077AA	

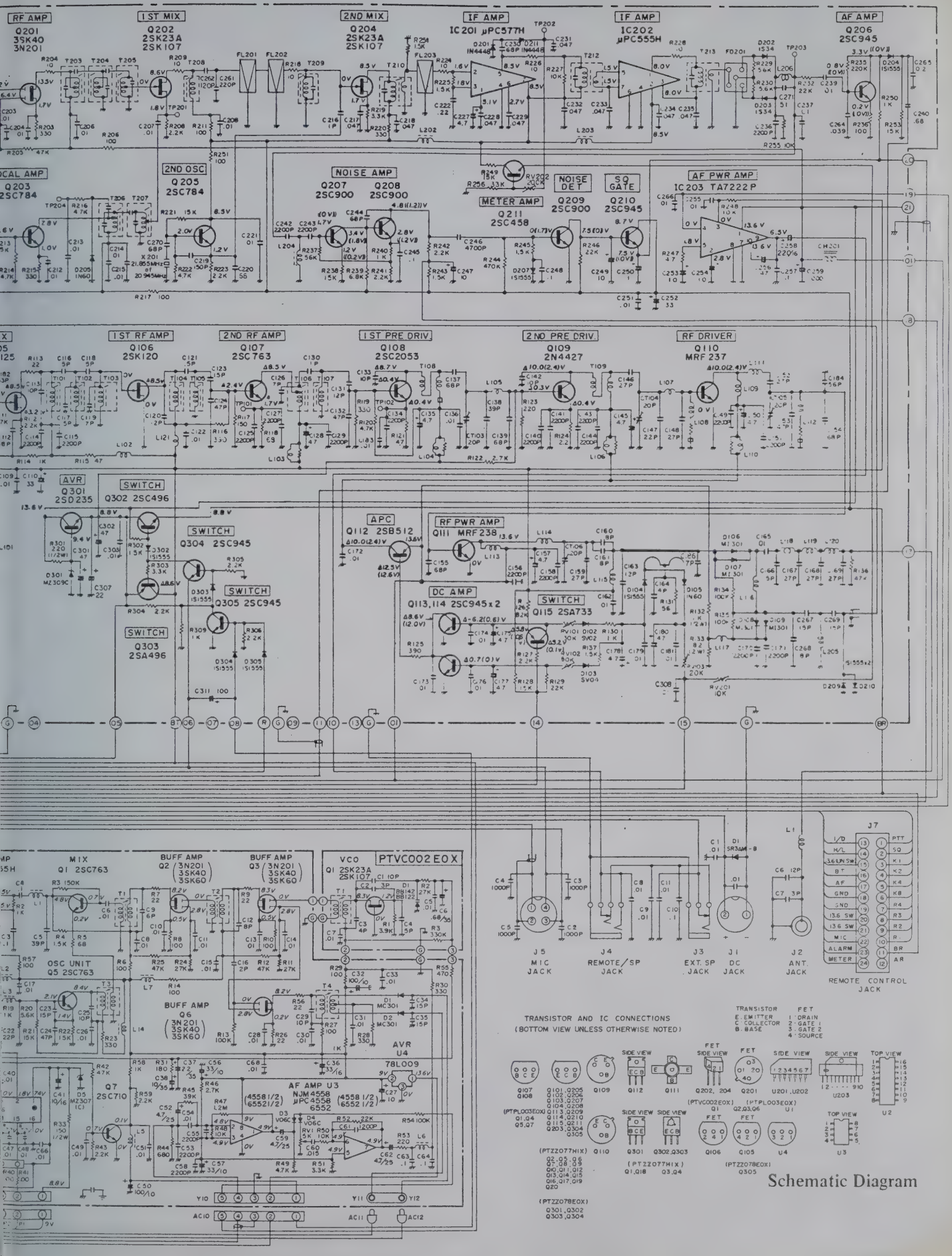
ITEM	REMARKS	PART CODE	STOCK NUMBER	CYBERNET PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				Q'TY USED
1		MW201BS002		TERMINAL						34
2		PTZZ077H1X		P.W.BOARD						1
3		QDG1S34XXT		GERMANIUM DIODE	1S34 NO-RANK	D10	D11			2
4		QDSMA150XN		SILICON DIODE	MA150 VF=1.2V,VR=35V NO-RANK 24MIN	D12	D13	D14	D16	13
5						D18	D2	D20	D3	
6						D5	D6	D7	D8	
7						D9				
8		QDSSR1KX4P		SILICON DIODE	SR1K-4 VR=200 4-RANK 25MIN	D15				1
9		QDZMZ304AE		ZENER. DIODE	MZ304A	D4				1
10		QDZMZ409CE		ZENER DIODE	MZ409-02-C C-RANK	D17				1
11		QQM01288AC		I.C.	L61288 DEGID-DRIVER	U7	U8			2
12		QQM04558AJ		I.C.	NJM4558D OPERATIONAL AMP.	U10				1
13		QQM51204AE		I.C.	M51204L	U9				1
14		QQP73ASLAU		I.C.	MPQ073ASL	C1				1
15		QQQ04011AA		I.C.	UPD4011C QUADRUPLE 2-INPUTNAND GATE	U2				1
16		QQQ04012AA		I.C.	UPD4012C	U3	U4			2
17		QQQ04015AA		I.C.	UPD4015C DUAL 4-bIT SHIFT REGISTER	U6				1
18		QQQ04081AA		I.C.	UPD4081C QUADRUPLE 2-INPUT AND GATE	U5				1
19		QTA0733XCA		TRANSISTOR	2SA733 C,R-RANK	Q10	Q11	Q12	Q15	6
20						Q16	Q9			
21		QTB0632AAC		TRANSISTOR	2SB632(E RANK)	Q3	Q4			2

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTZZ077AA	

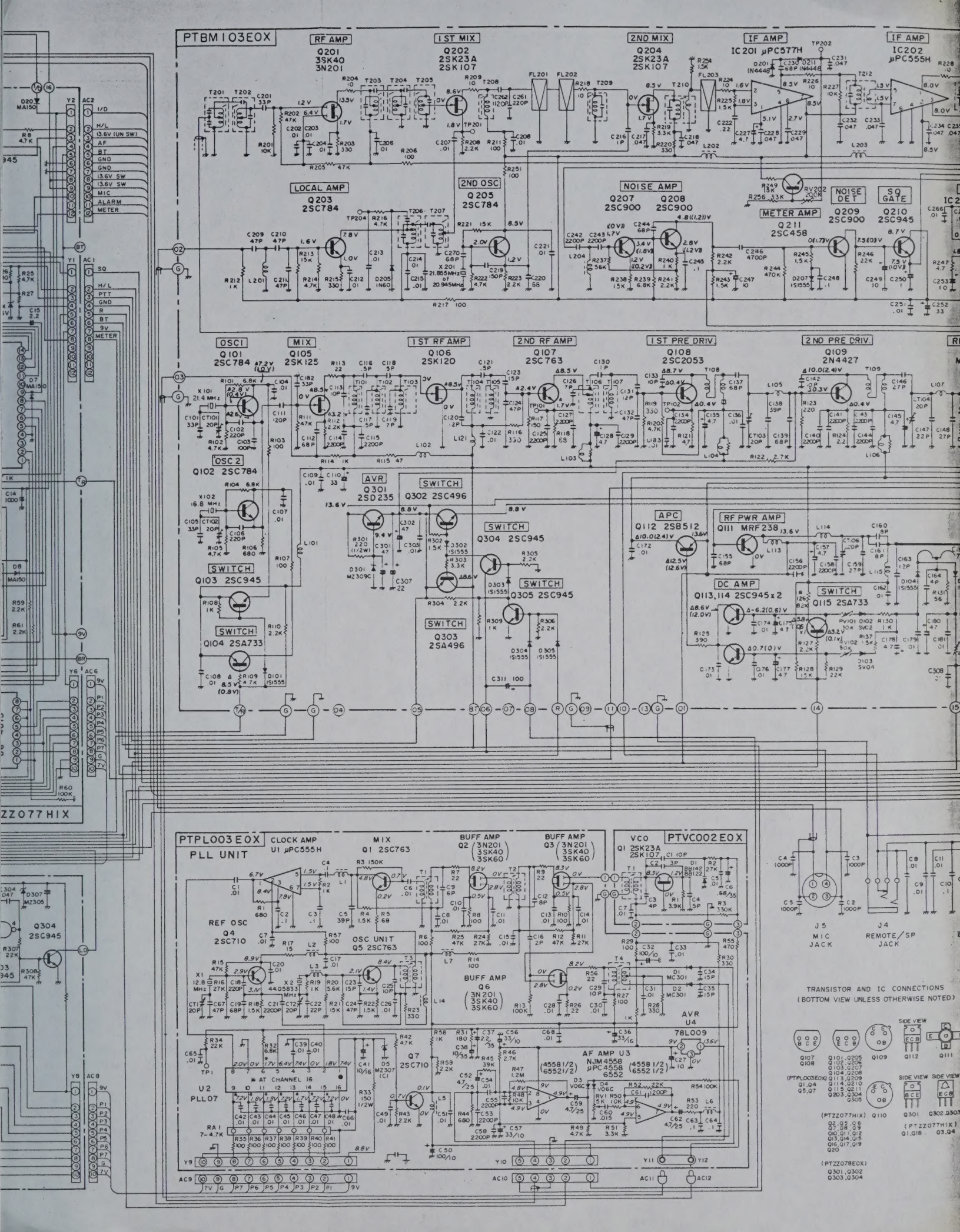
ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		QTCC90CXCA		TRANSISTOR	2SC900 U-RANK	Q7				1
2		QTCC945ACA		TRANSISTOR	2SC945A P,Q-RANK	Q13	Q14	Q17	Q2	6
3						Q20	Q5			
4		QTDD313XAC		TRANSISTOR	2SD313 C,D-RANK	Q1	Q18			2
5		QTDD545XAC		TRANSISTOR	2SD545 F-RANK	Q6	Q8			2
6		QVESV03XXD		VARISTOR	SV03 AD-RANK (VF:1.60V-2.00V)	D1				1
7		RD25PJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R37	R39	R41	R43	4
8		RD25PJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R73				1
9		RD25PJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R52	R54	R56	R58	6
10						R60	R62			
11		RD25PJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R13	R45	R46	R51	10
12						R53	R55	R57	R59	
13						R6	R61			
14		RD25PJ333X		CARBON FILM R.	0.25W 33K OHM 5%	R63				1
15		RD25PJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R79				1
16		RD25PJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R64				1
17		RD25VJ101X		CARBON FILM R.	0.25W 100 OHM 5%	R10	R15			2
18		RD25VJ102X		CARBON FILM R.	0.25W 1K OHM 5%	R28	R84			2
19		RD25VJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R67	R71			2
20		RD25VJ104X		CARBON FILM R.	0.25W 100K OHM 5%	R49	R50			2
21		RD25VJ204X		CARBON FILM R.	0.25W 200K OHM 5%	R23				1

	PART NAME	PART CODE	
	P.W.BOARD ASSY	APTZZ077AA	

ITEM	REMARKS	PART CODE	STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		RD25VJ222X		CARBON FILM R.	0.25W 2.2K OHM 5%	R24 R5 R83	3
2		RD25VJ302X		CARBON FILM R.	0.25W 3K OHM 5%	R11	1
3		RD25VJ332X		CARBON FILM R.	0.25W 3.3K OHM 5%	R12	1
4		RD25VJ471X		CARBON FILM R.	0.25W 470 OHM 5%	R1 R4	2
5		RD25VJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R25 R47 R48 R65	13
6						R66 R68 R69 R7	
7						R70 R72 R8 R82	
8						R9	
9		RD25VJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R29	1
10		RD25VJ561X		CARBON FILM R.	0.25W 560 OHM 5%	R20 R21 R22 R3	4
11		RD25VJ562X		CARBON FILM R.	0.25W 5.6K OHM 5%	R27	1
12		RD25VJ681X		CARBON FILM R.	0.25W 680 OHM 5%	R18 R26	2
13		RD25VJ682X		CARBON FILM R.	0.25W 6.8K OHM 5%	R38 R40 R42 R44	4
14		RF03SK470B		WIRE WOUND R.	3W 47 OHM 10%	R77	1
15		RGHANJ121B		M-OXIDE FILM R.	1/2W 120 OHM 5%	R74 R75 R76 R80	4
16		RG1ANJ101B		M-OXIDE FILM R.	1W 100 OHM 5%	R16	1
17		RG1ANJ181B		M-OXIDE FILM R.	1W 180 OHM 5%	R2	1
18		RG2ANJ47JB		M-OXIDE FILM R.	2W 47 OHM 5%	R30 R31 R32 R33	7
19						R34 R35 R36	
20		RPEAB20301		SEMI-FIXED VR.	20K OHM B-CURVE	RV1	1
21		RXHANJ4R7B		M-OXIDE FILM R.	1/2W 4.7 OHM 5%	R78 R81	2



Schematic Diagram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1ST MIX
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2SK107
2ND MIX
Q204
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2SK107
IF AMP
IC201 μPC577H
IF AMP
IC202
μPC555H
LOCAL AMP
Q203
2SC784
2ND OSC
Q205
2SC784
NOISE AMP
Q207
Q208
2SC900
2SC900
METER AMP
Q211
2SC458
NOISE DET
Q209
2SC900
SQ GATE
Q210
2SC945
OSC1
Q101
2SC784
MIX
Q105
2SK125
1ST RF AMP
Q106
2SK120
2ND RF AMP
Q107
2SC763
1ST PRE DRIV
Q108
2SC2053
2ND PRE DRIV
Q109
2N4427
OSC 2
Q102 2SC784
AVR
Q301
2SD235
SWITCH
Q302 2SC496
SWITCH
Q304 2SC945
SWITCH
Q103 2SC945
SWITCH
Q104 2SA733
SWITCH
Q303
2SA496
SWITCH
Q305 2SC945
APC
Q112 2SB512
RF PWR AMP
Q111 MRF238
DC AMP
Q113,114 2SC945x2
SWITCH
Q115 2SA733
PTPL003EOX
PLL UNIT
CLOCK AMP
U1 μPC555H
MIX
Q1 2SC763
BUFF AMP
Q2 (3N201 3SK40 3SK60)
BUFF AMP
Q3 (3N201 3SK40 3SK60)
VCO
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2SK107
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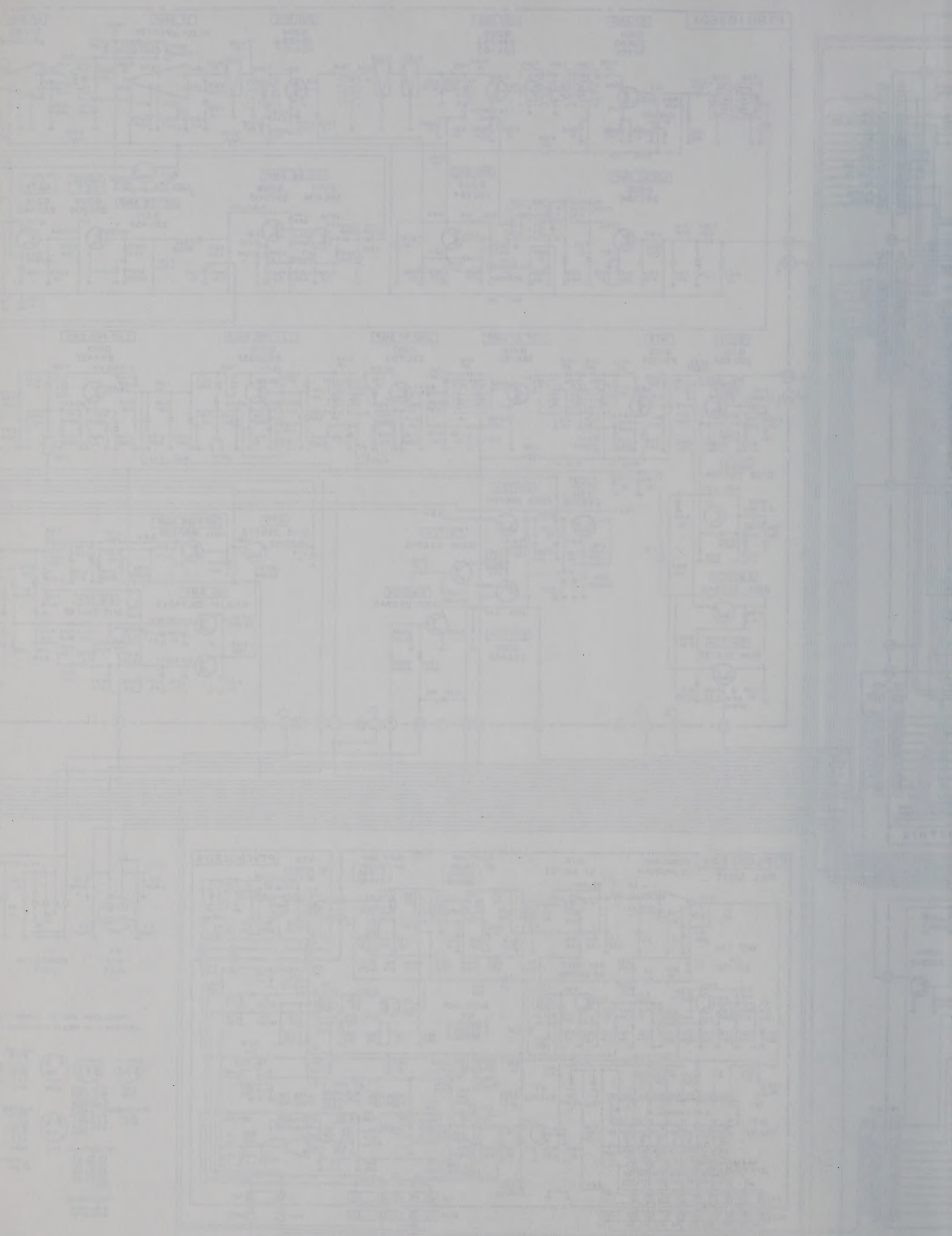
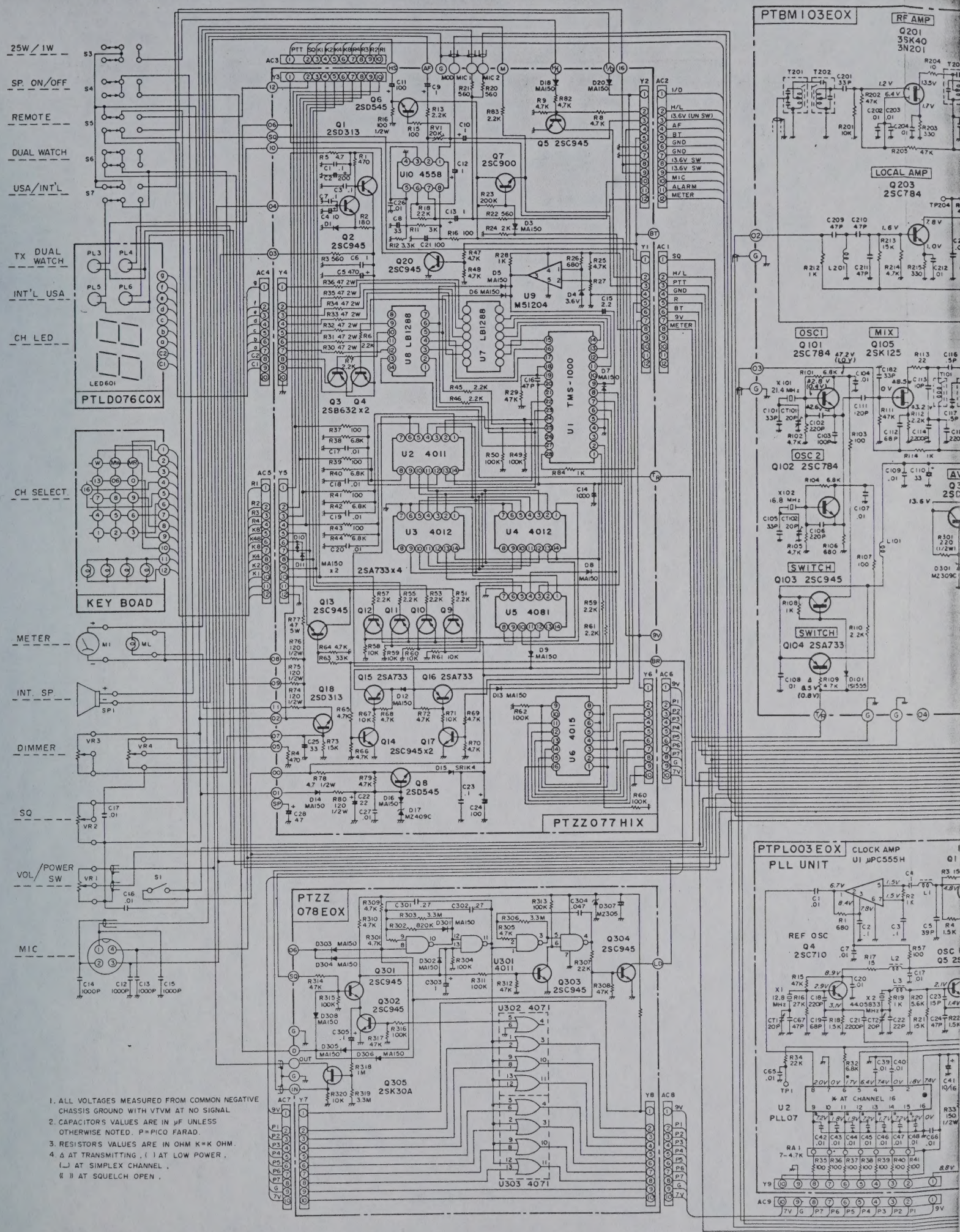
2SC710
OSC UNIT
Q5 2SC763
BUFF AMP
Q6
(3N201 3SK40 3SK60)
Q7
2SC710
AF AMP U3
NJM4558
μPC4558
6552
(4558 1/2)
(6552 1/2)
78L009
U2
PLL07
AVR
U4
J5
MIC
JACK
J4
REMOTE/SP
JACK
TRANSISTOR AND IC CONNECTIONS
(BOTTOM VIEW UNLESS OTHERWISE NOTED)
SIDE VIEW
Q107
Q108
Q109
Q112
Q111
(PTPL003EOX)
Q1,Q4
Q5,Q7
Q110
Q301
Q302,Q303
(PTZZ077HIX)
Q2,Q5,Q6
Q7,Q8,Q9
Q10,Q11,Q12
Q13,Q14,Q15
Q16,Q17,Q19
Q20
(PTZZ078EOX)
Q301,Q302
Q303,Q304
(PTZZ077HIX)
Q1,Q18 · Q3,Q4
ZZ077HIX





1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE CHASSIS GROUND WITH VTVM AT NO SIGNAL
2. CAPACITORS VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=PICO FARAD.
3. RESISTORS VALUES ARE IN OHM K=K OHM.
4. Δ AT TRANSMITTING, ( ) AT LOW POWER, (_) AT SIMPLEX CHANNEL, (( )) AT SQUELCH OPEN.